

ADDITIONS TO THE EURASIAN SALDID FAUNA, WITH A DESCRIPTION OF FOURTEEN NEW SPECIES (HETEROPTERA, SALDIDAE)

by

R. H. COBBEN

Department of Entomology, Agricultural University, Wageningen, The Netherlands

ABSTRACT

The following new species of Eurasian Saldidae are described: *Halosalda coracina* (Greece), *Saldula hasegawai* (far East USSR, Japan), *S. taiwanensis* (Taiwan), *S. sibiricola* (USSR: Kazakhstan), *Macrosaldula clavalis* (USSR: Georgia), *M. inomata* (Iraq), *M. kerzhneri* (USSR: Kazakhstan), *M. kokshetavica* (USSR: Kazakhstan), *M. miyamotoi* (Japan), *M. shikokuana* (Japan), *M. simulans* (Siberia, Mongolia), *M. violacea* (Far East of USSR, Japan), *Calacanthia grandis* (China), *Salda kiritshenkoi* (USSR: Central Asia, Far East, N. E. China, Japan). A new subspecies *M. oblonga acetabularis* is described from Kazakhstan. *Salda nevadensis* Wagn. and *S. littoralis piechockii* Wagn. are synonymized with *S. littoralis* L. Lectotypes are designated for *Salda micans* Jak., *S. splendens* Jak. and *Macrosaldula roborowskii* Jak. comb. n. (transferred from *Chartoscirta*). The *Macrosaldula* clade is discussed; it is provisionally taxonomically treated as a genus. A tentative key is presented for 21 species of *Macrosaldula* presently recognized in Eurasia. Preliminary redefinitions of *M. jakovleffi* Reut. and *M. nivalis* Lindb. are provided, whereas the status of *M. mongolica* Kir. needs further confirmation. The known localities of *Macrosaldula*, *Teloleuca* and *Salda* species (except for those from W. Europe) are mapped and the zoogeography of these genera is briefly discussed.

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INTRODUCTION

The present study is based predominantly on a revision of saldid material collected by Russian and Japanese heteropterists in the eastern parts of the Palaearctic. I have added some new species from Greece, Iraq and China, which certainly belong to supraspecific taxa having originated in the northern hemisphere of the Old World. The description of one species from Taiwan is included here as well, although it may be a member of a species group from a more southern origin. Although the description of some species is based on only scanty material and, consequently, the knowledge of variability

and distributional patterns is limited, I refrained from a further delay of publication. This revision may stimulate the study of material I have not seen, and exploration of areas from which no or only sparse data are available. Detailed ecogeographical analyses of population structures of selected species groups, as for example undertaken by Dr P. Lindskog (in prep.) on the complex *S. orthochila-burmanica* (see p. 225), are dependent on more numerous material than I had the opportunity to study.

The present paper does not include a revision of the abundant material in Russian and Japanese collections of small-sized typical *Saldula* and *Micracanthia* species. Such a revision is urgently needed in order to understand the zoogeography of these world-wide genera with preponderance of species occurring in the northern hemisphere. I sincerely hope that Dr N. N. Vinokurov (Yakutsk, USSR), who initiated a fine, detailed study on this difficult group of saldids in Eastern USSR (Vinokurov, 1975, 1978, 1979a—c, 1981), will eventually be successful in preparing a comprehensive revision. We may expect more examples of Holarctic dis-

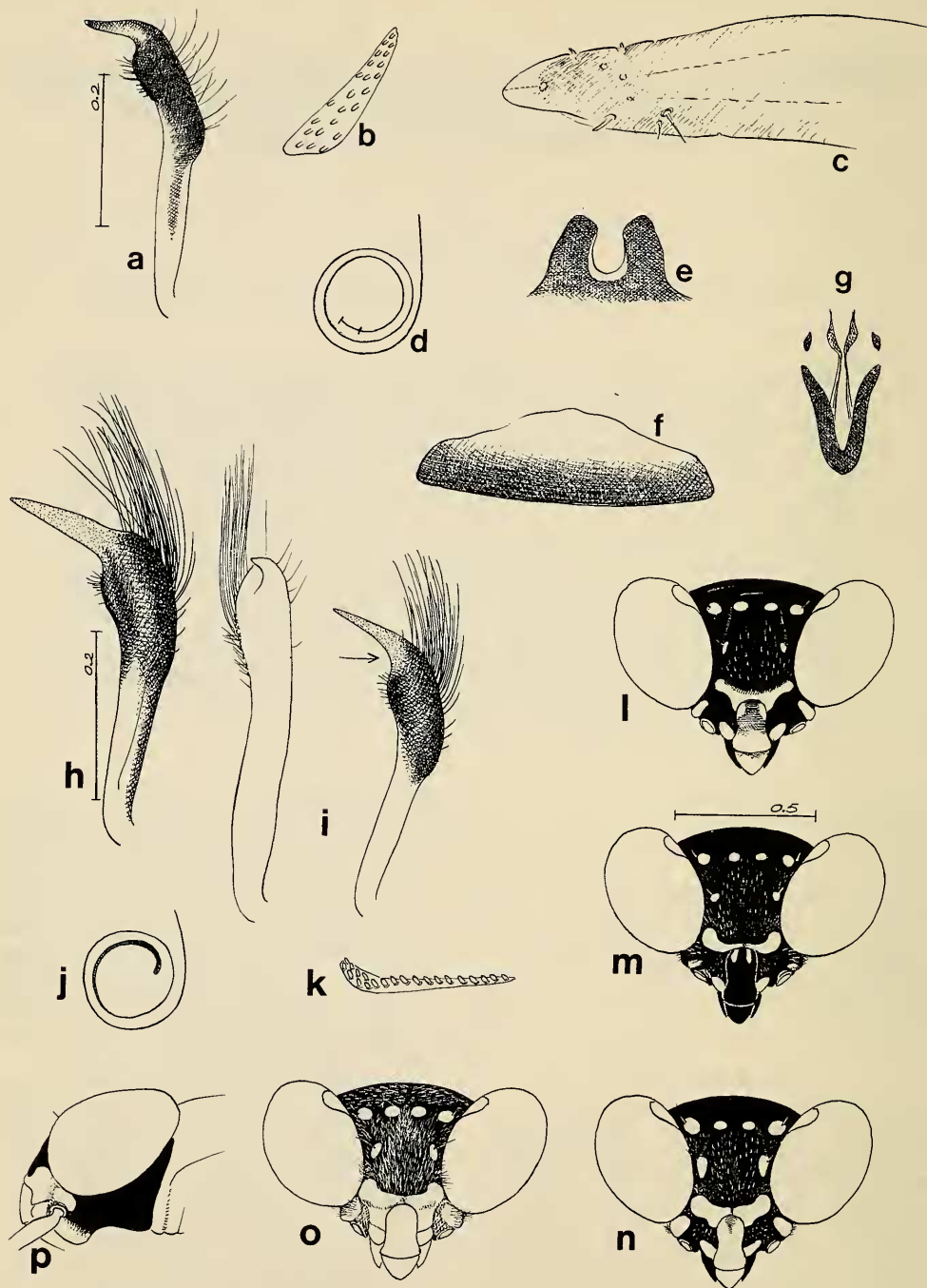


Fig. 1. a—g, *Saldula hasegawai*. a, paramere; b, grasping plate of ♂; c, apex of paramere; d, base of penisfilum of two specimens; e, parandria; f, subgenital plate; g, median endosomal sclerite. h—p, *Halosalda*. h, o, p, *H. lateral*; i, j—l, *H. coracina*; m, n, *H. concolor*; h, i, paramere, left figure of i as seen in direction of arrow in right figure; j, penisfilum; k, grasping plate; l—o, frontal aspect of head; p, left view of head.

tribution to be added to those presently known.

Eight of the new species described below belong to a group of species which is treated here as the genus *Macrosaldula*. A preliminary discussion on its status is given on page 232 and a key to the 21 species now recognized is added. I intend to devote a separate paper to the pressing problem of generic delimitations in the Saldidae after publication (Cobben in press) of descriptions of some twenty new taxa, mostly from Africa.

I dedicate this paper to Prof. A. N. Kiritshenko (1884—1971), the founder of Russian saldid taxonomy who had already labelled some presently described species as new to science in Russian collections.

DESCRIPTION OF SPECIES AND COMPARATIVE NOTES

Halosalda coracina sp.n. (figs. 1 i—l; 2a, b).

Description. — For measurements, see table 1. Typical *Halosalda* habitus, but dorsal cuticle completely bare, highly smooth and polished. Greece.

The characters of this new species are presented in comparison with conditions in the other two *Halosalda* species. Since only of *H. lateralis* (Fallén, 1807) and *H. concolor* (Putton, 1880) macropters are known, comparisons below refer to semibrachypterous specimens (forewing more or less coleopterous due to substantial reduction of membrane).

	<i>coracina</i> sp.n.	<i>concolor</i>	<i>lateralis</i>
body length in mm ♂	3.4—3.6	3.2—3.7	3.2—4.1 ¹⁾
♀	3.7—3.8	3.6—4.0	3.6—4.6 ¹⁾
general coloration	type series uniformly black, apex of wing often narrowly pale; pronotum entirely black, rarely with lateroventral pale streak	variable (see figs. 102—105 in Cobben, 1960); extension of black pigment spreading in eunomic series from mesocorium outward; predominantly dark specimens in west mediterranean	highly variable, but pale specimens predominating (see figs. 94—98 in Cobben, 1960); extension of dark pigment in wing starting from lateral sides
structure of forewing	strongly coreaceous and transversely vaulted; remnant of membrane not visibly demarcated from corium	as <i>coracina</i> but less vaulted; membrane weakly set off from corium	not coleopteroid, dorsum in cross-section weakly convex; visible borderline between corium and membrane
cuticle of forewing	highly polished, entirely smooth without any sculpture, commissure between clavus and corium lined with a row of pits	shiny, weakly rugose; suture between clavus and corium indistinct	weakly shining, clearly rugose; suture between clavus and corium not obvious, but claval ridge along inner side of commissure distinct
texture of dorsum	hairless	with very scattered short adpressed setae (distance between setae wider than length of setae)	with rather dense regular coat of short decumbent setae (distance between setae much shorter than length of setae).

¹⁾ These numbers refer to specimens from various origins; the mean value for material from the west continental coasts is clearly higher than for specimens from the British Isles and countries bordering the Black Sea.

ratio: width/length of pronotum	♂	2.05—2.25	2.50—2.70	2.60—2.75
	♀	2.35—2.50	2.65—2.90	2.70—2.95
scutellum		anterior mid part with shallow depression	flat	flat
head		very polished, frons with only few scattered setae; white parties of mouth sclerites mostly as in fig. 1l, sometimes as in fig. 1m or in between fig. 1m and n, but lateral edges of transverse band (postclypeus) never that swollen	rather shiny, frons somewhat rugose, moderately beset with short setae (fig. 1m, n); pigmentation of mouth sclerites varying between fig. 1m and n, and sometimes grading into fig. 1o, particularly in specimens from Cyprus	rather dull, frons and vertex thickly covered with pale setae (fig. 1o); mouth sclerites extensively light- coloured; post-clypeus transversely well- developed, fused with mandibular plates and lateral swellings between eye and antennal socket
antennae		dark brownish, inner side of segment 1 yellowish	dark specimens: segment 1 and 2 pale, outer side with brown streak; light- coloured specimens from Cyprus: entirely pale	entirely pale, segment 1 and 2 often with dark line along external side
legs		first acetabula largely pale; coxa blackish, femur and tibia ochreous with dark longitudinal stripes	dark specimens: first acetabula narrowly or largely pale; legs with short brownish stripes; lightest specimens: all acetabula and entire legs whitish	as in <i>concolor</i>
genitalia		parandria slender (fig. 2b)	parandria blunt (fig. 2c)	parandria blunt (fig. 2c)
known geographic distribution		coast of NE Greece	mediterranean (Italy, France, Spain, Tunisia, Cyprus, Corfu)	widely Palaearctic

Material. — Holotype (♂), Porto Lagos, NE Greece, 23.viii.1983, leg. R. H. Cobben. Paratypes 9 ♂ 4 ♀, idem. Holotype and paratypes in coll. Wageningen¹⁾, paratypes in Leningrad coll. and in coll. Drosopoulos, Athens.

Comparative notes. — The type series, all strongly semibrachypterous, was collected on open patches of moist sandy soil in *Salicornia* vegetation in the dunes bordering the Aegean

Sea. The species occurred simultaneously with *H. lateralis*. Since sampling was done in the evening twilight and only two specimens of *H. lateralis* were seen, the possibility of a difference in the daily period of activity between both species cannot be excluded. The most reliable character of *H. coracina* separating it from the other two species, lies in the lack of any dorsal sculpture and pilosity. As regards the coloration, the new species forms the most dark extreme of a gradual series of colour morphs, in which *H. lateralis* represents the opposite extreme of predominantly light-coloured specimens. *H. concolor* has a more or less intermediate position, at

¹⁾ The indication "coll. Wageningen" throughout this paper means: the collections of the Department of Entomology of the Agricultural University at Wageningen.

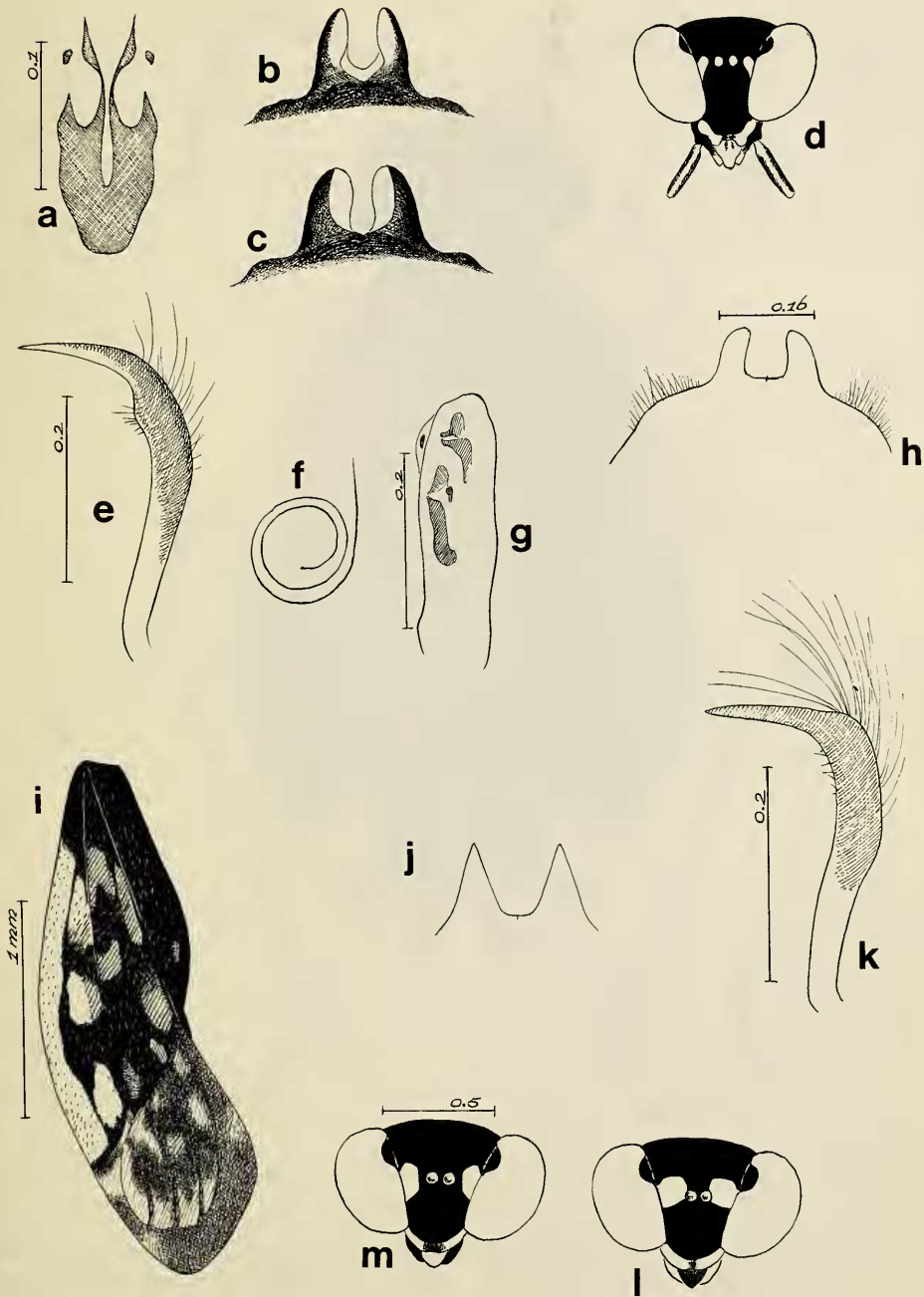


Fig. 2. a—c, *Halosalda*. a, *H. coracina*, median endosomal sclerite; b, c, parandria of *H. coracina* (b), *H. lateralis* and *H. concolor* (c). d—i, *Saldula taiwanensis*. d, frontal aspect of head of ♂; e, paramere; f, penisfilum; g, left view of penis; h, parandria; i, left fore wing. j—l, *Saldula inoana*. j, parandria; k, paramere; l, frontal aspect of head of ♂; m, *Saldula uichancoi*: frontal aspect of head of ♂.

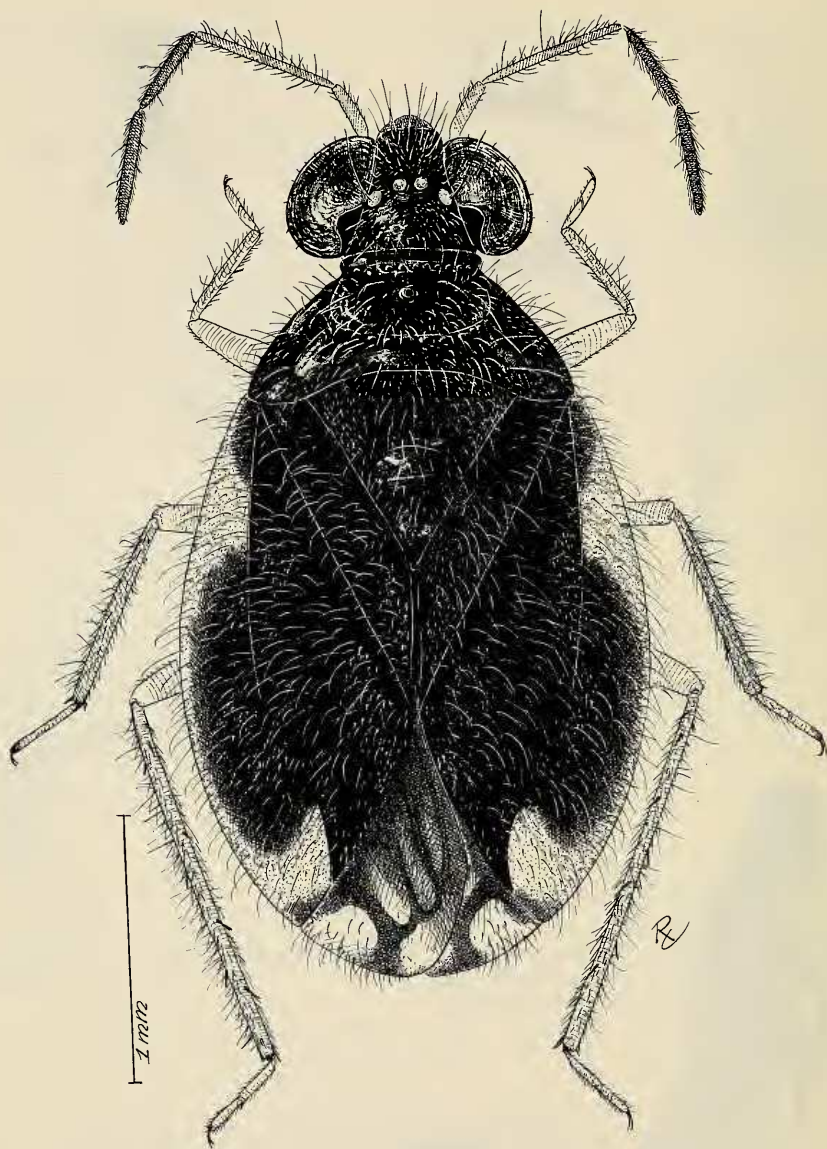


Fig. 3. *Saldula basegawai*, general facies of ♀.

least in the western mediterranean, where I often collected it together with *H. lateralis*. A population from Cyprus (near Akrotiri, 21.vi.1951, leg. G. Mavromoustakis), which on the basis of cuticular structure and paucity of setae definitely belongs to *H. concolor*, is considerably different. All its individuals are extremely lightly pigmented. Some are even more pale than the lightest individuals of *H. lateralis* I

have seen, the mid frontal pale spots on the head conjugating with the transverse postclypeal swelling. This sample from Cyprus furthermore contains a high percentage of macropters (6 macropteres, 4 semibrachypters), the first seen in *H. concolor*. Although Akrotiri is close to the sea, the locality label mentions "in fresh water marshes". This fits in with my own and Josifov's (1957) experience that the macropters of

H. lateralis are occasionally found outside the main habitat of the species.

It is expected that *H. coracina* occurs further eastward in coastal salt-marshes in Turkey. My collections from more south-eastern and western parts of Greece so far revealed only the presence of *H. lateralis*. The distribution pattern of *H. concolor* is still fragmentary, and collections containing material from southern origins identified as *H. lateralis* need to be reinvestigated. On my request, Dr Kerzhner checked the abundant material in the Leningrad Museum and concluded that it all refers to *H. lateralis* proper. This Euro-Siberian species occurs all over Europe inclusive of Scandinavia and its eastern range covers East-Mongolia and Transbaikial.

***Saldula hasegawai* sp.n.**

(figs. 1a—g; 3)

Description. — For measurements, see table 1. Rather small (3.0—3.6 mm), head and thorax black, glossy, wing dull-black with ochreous wing margin, semibrachypterous (membrane half-way reduced), whole body with long pilosity. Japan, Far East of the USSR.

Head: black, spherical preocellar spot and all mouth-part sclerites, gular lobe and rostrum yellowish brown; glabrous yellowish white tumescence in between antennal socket and eye; dorsal surface with numerous erect dark setae as long as the trichobothrial setae and with recumbent short golden setae; eyes with short setae; underside with semilong adpressed silvery setae. Thorax: black, glossy, densely covered dorsally with upstanding black setae and recumbent semilong light setae; pronotum with distinct collar, separated from callus by row of pits, lateral sides weakly convex or straight, frontal edges not wider than collar; dome about two-and-a-half times as long as posterior lobe, posterior border of dome lined with pits.

Wing: ashy black, clavus without apical pale spot, endocorium entirely dark in specimens from Japan, with one slight spot in centre and another one on inner edge in specimens from E. USSR; exocorium convex laterally, with light brown lateral margin extending in light subbasal and apical spot; with long erect brown and recumbent, shaggy, semilong golden setae; membrane distinctly reduced, dark smoky with ochreous spots or entirely testaceous; hypocostal lamina without secondary oblique ridge; apex of hind wing reaching level of base of membrane.

Extremities: ratio of antennal segments 1 : 2.1 : 1.5 : 1.5, segments 1 and 2 brown, shining, with erect brown setae, which are slightly longer than diameter of segment, and some setae of greater length on segment 2; segments 3 and 4 dark-brown with short white setae and scattered dark erect bristles. Legs unicolorous light-brown, acetabula and coxae black; tibiae with erect brown setae, which along outer margin are longer than width of tibiae, and dark spines as long as tibial diameter.

Other structures: rudiment of larval organ and sclerites of pregenital gland present; subgenital plate of ♀ broadly truncate (fig. 1f), grasping plate of ♂ with some 23 pegs (fig. 1b); parandria and paramere as figured (figs. 1e, a, c), penisfilum coiled 2½ times, endosomal sclerite of normal shape (fig. 1g).

Holotype ♂, length 3.16 mm, width 1.70 mm. Paratypes, 4 ♂, length 2.8—3.05 mm, width 1.6—1.7 mm; 5 ♀, length 3.2—3.7 mm, width 1.78—1.9 mm.

Material. — Holotype (♂), Japan, Osorezan, Aomori Pref., 2.viii.1953, leg. H. Hasegawa (in coll. Wageningen). Paratypes, 3 ♂ 4 ♀, idem (in Hasegawa coll.); 1 ♂ 1 ♀, USSR, Sudzuke (now Zapovednyy), 25 km S of Sokolovka Primorskiy Kray, coast of Japanese Sea, 22.viii.1959, leg. I. Kerzhner; 1 ♂, near Vladivostok, 26.vii.1925, leg. Rostovkykh (in coll. Leningrad Museum).

Comparative notes. — Superficially this new species resembles on the one hand the *Micranthia fennica* group in general facies, pigmentation (fig. 4g—j) and shape of the paramere (fig. 4a—f), and, on the other hand, the Nearctic *Saldula bouchervillei* (Prov.) (fig. 4m), *S. orbiculata* Uhl. (fig. 4n) and *S. severini* Harr., in colour pattern and pilosity. Particularly the resemblance with *S. orbiculata* is rather strong, but unlike in that species the pruinose areas on the wings are lacking in *S. hasegawai*. Besides smaller specific differences (e.g. in shape of parameres, compare fig. 1a with figs. 4k, 1), *S. hasegawai* deviates clearly from all these species in having a glabrous, lightish tumescence between antennal socket and eye, and in not having the secondary hypocostal ridge.

***Saldula taiwanensis* sp.n.**

(fig. 2d—i)

Description. — For measurements, see table 1. Rather small (3.5—4.0 mm), short-haired, head and thorax black, moderately shiny, wings fully developed, with black, bluish pruinose

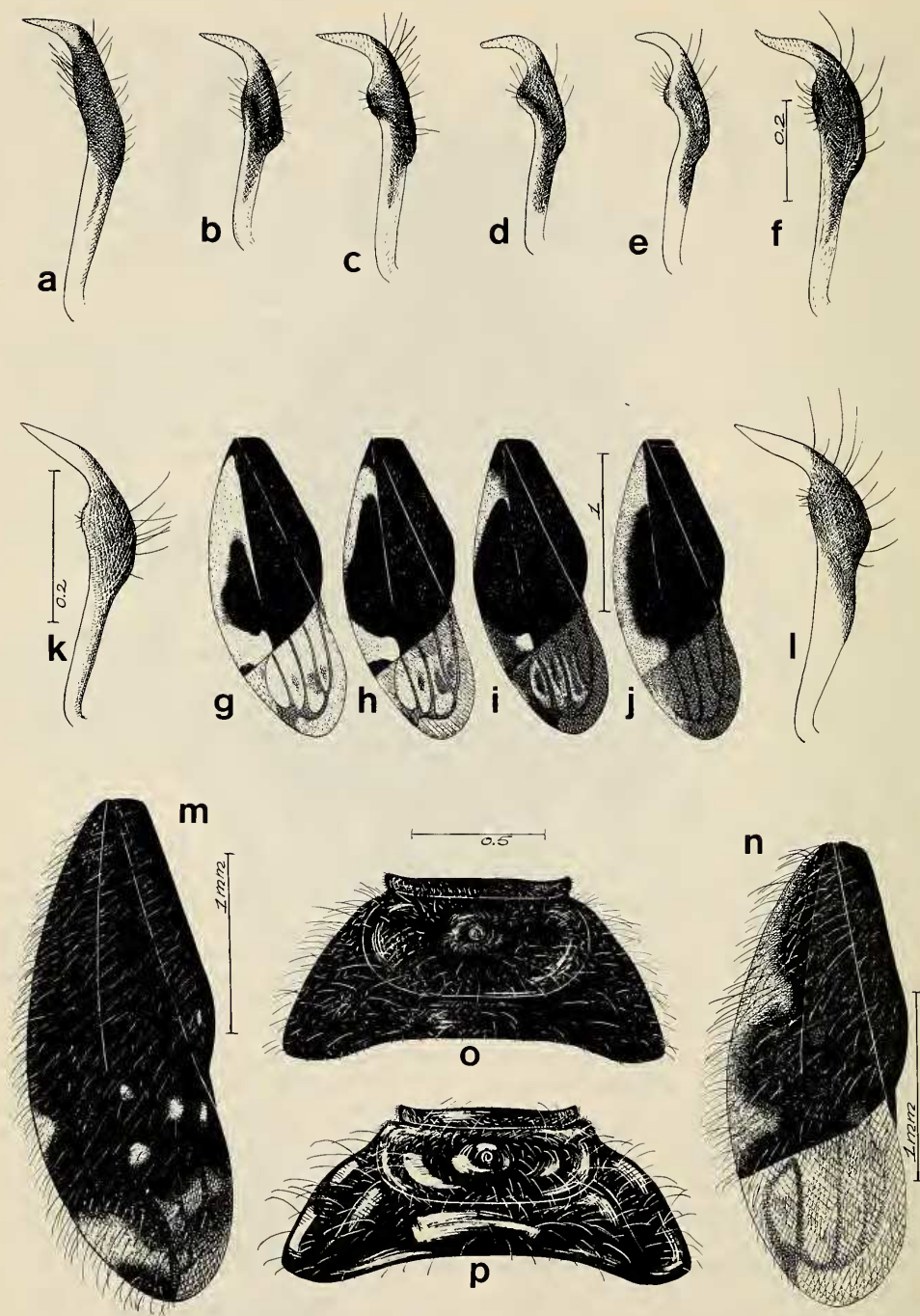


Fig. 4. a—j, *Micracanthia*. a—f, paramere; g—j, left fore wing. a, *M. marginalis*; b, *M. humilis*; c, *M. drakei*; d, *M. husseyi*; e, *M. pumpila*; f, *M. floridana*; g—i, *M. marginalis*; j, *M. fennica*; k, m, o, *S. bouchervillei*. l, n, p, *S. orbiculata*. k, l, paramere; m, n, left fore wing; o, p, pronotum.

and white markings more or less like in the genus *Chartoscirta*. Taiwan.

Head: black, anteclypeus, maxillary and mandibular plates largely yellowish, labrum black with central part lightish, apex of gular lobe yellowish, preocellar spot broadly touching eye margin (fig. 2d); short adpressed golden hairs, vertex with several semilong erect black setae, underside with dense silvery pubescence; rostrum brown, reaching in between hind coxae. Thorax: black, rather shiny, with adpressed short golden pubescence, side margin of pronotum straight or weakly concave, front edges slightly wider than collar; acetabula black.

Wings with irregular golden pubescence, on mid part somewhat shaggy, clavus with only apical, small lightish spot, embolium yellowish with black base; distribution of black, white and pruinose areas of corium and pigmentation of membrane as in fig. 2i; hypocostal suture present.

Extremities: antennae, length of segments given in table 1, nr. 3, segment 1 yellowish brown, underneath black; other segments dark brown with short brown hairs, additional erect hairs on segments 3 and 4 not longer than diameter of segment. Legs yellowish, coxae dark brown, femora ventrally with dark streak, flat sides with brown dots; knees and apex of last tarsal segment fuscous.

Other structures: larval organ present, stigmata not contacting side margins of sternites, male coupling plate with about 18 small pegs. Genital capsule of male with erect long brown setae on dorsolateral sides; parandria widely separated (fig. 2h); paramere with sharp processus hamatus (fig. 2e); length of penisfilum and phallic sclerites as in figs. 2f and g. Subgenital plate of ♀ broadly rounded, whitish.

Material. — Holotype (♂), Taiwan, Baron-Nishimura, 10.viii.1941, leg. H. Hasegawa (in coll. Wageningen). Paratypes idem 8 ♂ 3 ♀ (in coll. Hasegawa and Wageningen); M. Taiwan, Keishinryo, nr. Chuchi, 1 ♂, 15.iv.1965, leg. T. Saigusa (in coll. Miyamoto).

Comparative notes. — The external aspect of *S. taiwanensis* resembles very much the Palaearctic *Chartoscirta cincta* (H.-S.). The new species, however, lacks the leg-wing sound producing mechanism altogether; the unique shape of the plectrum is diagnostic for *Chartoscirta*. Other characters (shorter first antennal segment, male genitalia) also prevent inclusion into *Chartoscirta*. The new species also has some superficial resemblance to species of the *S. fletche-*

ri group (e.g. *S. fletcheri* (Dist.), *S. inoana* Dr., *S. uichancoi* Dr. & Viad.). Male genitalia (fig. 2j, k), and other characteristics (fig. 2l, m) of this group are quite different from *S. taiwanensis*.

***Saldula burmanica* Lindskog, 1975 subsp.n.?** (fig. 5a—d, f, g)

Description. — For measurements, see table 1. Medium sized (3.4—4.6), mounticolous species of the *orthochila* group, coalblack with dense, often conspicuous semierect dark pubescence, shining head, thorax and lateral wing margin; wing mostly with some greyish white spots, clavus most often with subbasal and subapical spot; polymorphous, usually broadly subovate subbrachypterous. Himalayan mountain chain, India, Nepal.

Head: rather shining, with recumbent light setae and some semilong dark setae which are shorter than the trichobothrial bristles, eye with scattered, very short setae; preocellar spot triangular, one side adjacent to eye; middle pair of trichobothrial setae on weak, black tumescence; anteclypeus with two bristles; mouthpart sclerites pale yellowish, more darkened in female, gular lobe black, rostrum light or dark brown. Thorax: shiny, glossy, with some light adpressed setae and an irregular vestiture of erect short or semilong dark setae; pronotum (fig. 5g) with straight or slightly convex lateral sides, proximal side somewhat wider than collar, dome not reaching side margins of pronotum, central pit deep, posterior margin indicated with row of pits; first acetabula with narrow pale margin, acetabula 2 and 3 entirely black.

Hemelytron (fig. 5f): dull, lateral explanate strip of exocorium and R + M ridge deep black, shining; other wing parts ashy grey and black with regular, rather short, semierect dark setae and some scattered golden adpressed setae, length of semierect setae subequal to width of hind tibia; clavus mostly with a small subbasal and subapical light spot, sometimes indistinct or absent; endocorium with varying number of small light spots, maximum number six, two near R + M ridge, four in distal part, light spots sometimes pruinose; exocorium with maximally three pale spots in the inner region and one larger spot distally near the wing margin; this latter spot remaining visible in otherwise entirely black specimens; membrane shining, dark-light pattern more or less as in fig. 5f, mostly subbrachypterous to varying degrees, sometimes tending to semibrachyptery at high altitudes (ca. 3000 m), hind wing as long as fore

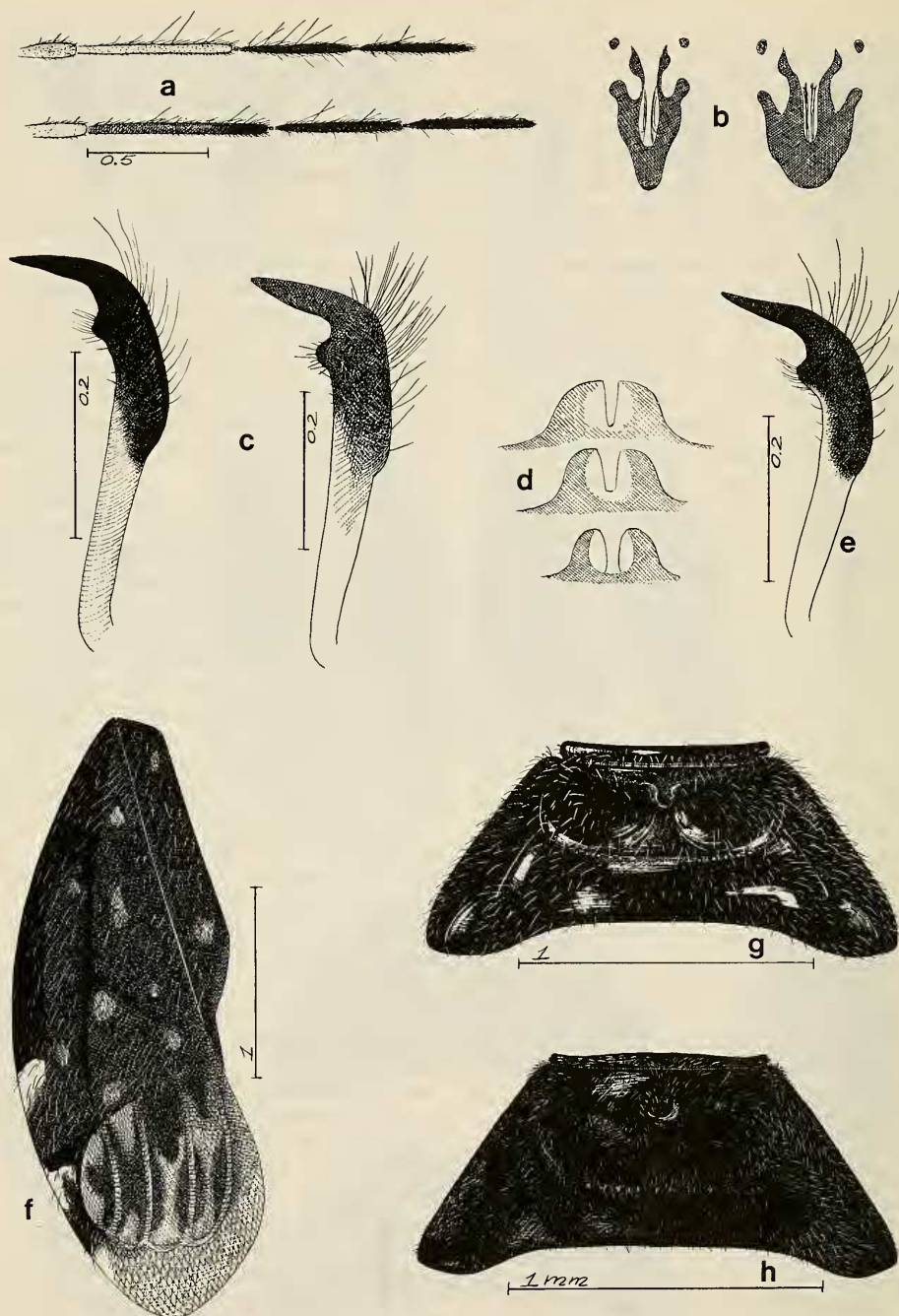


Fig 5. a, Antenna of *S. orthochila* from W Europe (above) and from *S. burmanica* (below); b, median endosomal sclerite of *S. orthochila* (left) and *S. burmanica* (right); c, paramere of *S. burmanica* from Nepal (left), India (right); d, parandria of *S. burmanica* from India (above), Nepal (middle), of *S. orthochila* (W Europe); e, paramere of *S. orthochila* from the Netherlands; f, g, *S. burmanica*; f, fore wing; g, pronotum; h, pronotum of specimen of the *burmanica* group from Vietnam.

wing or reduced till apex of clavus of fore wing; submacropterous condition of fore wing rare.

Extremities: Antennae shining, segment 1 light brown with some semilong dark bristles; segment 2 light or dark brown with short dark setae and some erect semilong dark setae along median side, 2—3 times as long as width of segment (fig. 5a below); segments 3 and 4 black; ratio of segments 1 : 2.5—2.6 : 1.7—1.8 : 1.9—2.1. Legs shining, testaceous, with short light brown pilosity, coxae black, femora with dark blots on flat sides and ventrally with black stripe; base, mid part and apex of tibiae darkened, black spines as long as diameter of tibia, last tarsal segment dark brown.

Other structures: larval organ absent, sclerite of pregenital gland present; subgenital plate of female broadly rounded, black, caudal margin sometimes narrowly pale; coupling plate of male with about 20 pegs in three rows, parandria broad, nearly adjacent (fig. 5d), paramere with acute-angled, black processus hamatus and pronounced processus sensualis with long, brown setae (fig. 5c); median endosomal sclerite as in fig. 5b, right; penisfilum coiled two times. Length of 10 ♂ 3.4—4.1 mm, width 1.8—1.9 mm; of 5 ♀ 3.9—4.9 mm, and 2.1—2.4 mm, respectively.

Material. — India: W. Almora, 2 ♂ 3 ♀, Kumaon, (no date), leg. H. G. Champion; Kumaon, Nainital, 1 ♀, (no date), leg. H. G. Champion; Chakrate Div., 2,300 m, 1 ♂, 1.vii.1932, leg. H. G. Champion; Unyal gaon, Sallana Tehri, Garhwal, near stream, 1830 m, 1 ♂ 1 ♀ 2.vi.1946, leg. J. K. Uniyal; Uttar Pradesh, Mussoorie, 1500—2200 m, 1 ♀, 3—14.viii.1978 (Copenhagen Zool. Mus. Exp.); Gopaldhara, Darjeeling, 1500—2000 m., 1 ♀, 16.ix.1917, leg. H. Stevens; Sikkim, Karponang 3,300 m, 2 ♀, 16—24.iii.1917 (leg. H. S.); Sikkim-Nepal frontier, Tonglu, 3,350 m, 1 ♀, vii—viii. 1919, leg. H. Stevens; Nepal: R. G. Yack Exp. 1 ♂, 12.vii.1972, leg. R. A. Laurence; Pangboche, 4000 m, shore of marsh, 14 ♂ 4 ♀, 11.vii.1964; Junbesi, 2900 m, 1 ♀, 28.vii.1964; between Those and Junbesi, 1 ♀, viii.1974, leg. C. Ravaccia; Puiyan, 2900 m, mist-forest, 19.vii.1964; Thangpoche, 3500 m, 1 ♂, 11.vii.1964; Pheriche, 4350 m, shore of swamp, 11 ♂ 7 ♀, 10.vii.1964, all. leg. R. Remane; Alm Darghari, Maharigaon, 4000 m, 1 ♀, ix.1971, leg. H. Franz; between Mulkharka and Tare-Pati, 1 ♀, ix—x.1971, leg. H. Franz; Langtan vall., 1 ♂ 1 ♀, 23.iv.1978, leg. H. Kraigher; Gufa, Terhathum Distr. 2950—3000 m, 1 ♂ 1 ♀, 29.x.1979, leg. M. Tomokuni; Ting Sang La, 3400 m, 1 ♂ 1 ♀, 13—15.iv.1973, leg. J. Martens.

Comparative notes. — I must give an explanation for the description of and discussion on a taxon presented here, which was perfectly described by Lindskog (1975) as *S. burmanica*,

based on 3 ♂ and 4 ♀ from one locality (1200 m) in NE Burma. Since more than 15 years I had in my collection specimens from high altitudes in India which I described in manuscript as a new species. In recent years I saw additional material from many localities in the Himalaya. Since my and also Lindskog's (1975, p. 170) belief was that indeed a valid species was involved, I prepared its formal description for the present paper. The manuscript of the present paper was sent to Dr Lindskog for his comments. Meanwhile Lindskog had also received many additional specimens of "the new species" and he wrote me that he is now inclined to consider it at most a subspecies of *S. burmanica* Lindskog. Having seen now the holotype and paratypes of *S. burmanica*, which were kindly sent by Lindskog for comparison, I agree with Lindskog's conclusion. Since the whole body of my manuscript had already achieved its final stage, inclusive the illustrations, I retain here my original text, with only some necessary amendments. I leave the final decision on the taxonomic status to Per Lindskog who is preparing a detailed study of the *burmanica-orthochila* complex. His paper will provide a much more detailed and geographical analysis than presented here.

Saldula orthochila Fieber, the closest relative of *S. burmanica*, differs in the following respects: more slender (ratio body length: width about 2.1—2.2, as against 1.8—2.0 in the *S. burmanica* form considered here); without long erect black setae on head and thorax and without erect dark pilosity on hemielytra; recumbent light setae more numerous; head and thorax less shining; first acetabula broadly light; lateral strip of fore wing dull, membrane for the major part hyaline (see for more differences Lindskog, 1975, p. 165). *S. orthochila* has a very wide distribution covering nearly all West European countries, and it is recorded eastwards from S Russia, Turkestan and Siberia (Cobben, 1960). Iran is added here as a new country record (Mazanderan, Chalus-valley, 1300 m, 1 ♀, 13.viii.1968, leg. Heinz). I have seen material from 3000m altitude in Tibet (Supi River, no date, 6 ♂ 14 ♀, leg. H. G. Champion, in Coll. BMNH, London) and from Kashmir (Rukshu, Tso-Morari, near frontier Tibet, 1 ♂, vii.1914, leg. G. Babault, in Coll. Smiths. Inst. Washington). These match specimens from W Europe, except for varying colour of second antennal segment (dark brown to light brown), for some long erect setae on head and pronotum, and for

somewhat denser and longer pilosity on the wings. Increasing pilosity at higher altitudes is also seen in other *Saldula* (e.g. *Saldula saltatoria*), but the pilosity of *S. orthochila* remains much less dense than in *S. burmanica*. The semibrachypterous *orthochila* from Tibet have further reduced hind wings, reaching about the apex of the clavus; the extending setae on the second antennal segment are of varying length, mostly shorter than in western populations. On the basis of all these characters, the *orthochila* material from Tibet seems somewhat intermediate between typical *S. orthochila* and *S. burmanica*. A study of the geographic variation of additional populations from western and more eastern parts of the Himalaya is needed in order to define subpopulations of *S. orthochila* and *S. burmanica*.

To my surprise, I came across one female from N Vietnam, which means a considerable extension of the known *orthochila-burmanica* chain. The specimen in the Smithsonian Institution, Washington, is labelled: Tonkin, Chapa, v.1916, leg. R. V. de Salvaza. It is long-winged, 4.51×2.20 mm, and conforms most to the description of *S. burmanica* (second antennal segment light-brown with mediolateral setae about two times as long as width of segment; area around subapical spot of clavus concolorous with the rest of clavus). The aspect of the pronotum (fig. 5h) seems to differ somewhat in that it tapers more narrowly towards the collar than in *orthochila* and our form of *burmanica* (fig. 5g). The taxonomic evaluation of the Vietnam individual must wait till males are available from that territory. It presumably lives there at high elevations. An extensive survey of the habitat and ecology of the *orthochila* group of species is presented by Lindskog (1975). Another species of this group, defined by the character set: second antennal segment with some erect bristle-like setae and absence of the larval organ, is *S. nobilis* Horv. with a Central European-Asiatic distribution. It is a mountainous species and the known records are scattered (see map 1). I have now seen the first specimens from Japan (Hokkaido, Kiyokawa near Ashora, 2 ♂ 1 ♀, 7.vii.1958, leg. S. Miyamoto; Berabonai, Ashoro, 1 ♀, 8.vii.1958, leg. S. Miyamoto; Kuttyaroko, 1 ♀, 11.viii.1937, leg. S. Asahina) and from China (Manchuria, 1 ♀, 25.vii.1943, leg. E. Kawase). Lindskog (1975) referred to *S. bouchervillei* Prov. (= *S. illinoensis* Dr.), a Nearctic species exhibiting phenetic affinities to the *orthochila* group. This species indeed has no larval

organ as is typical for the *orthochila* group. A reliable cladistic analysis of the species clusters of the genus *Saldula* would ultimately bring out whether the Palearctic and the Nearctic assemblage of species, lacking the larval abdominal organ (Cobben, 1957, 1959), form together a monophyletic group. An independent loss of that organ seems probable. Other species in the Nearctic Region, which lack such organ, belong to different complexes. They are *S. villosa* Hodgd. (California, Oregon) on the one hand, and *S. laevis* Champ. and *S. sulcicollis* Champ., both from Guatemala and Mexico, on the other hand. *Oiosalda caboti* Drake & Hoberlandt, 1952 (Colombia) seems to be most closely related to the latter two species, but actually possesses a larval organ. Definitely not closely related to the *orthochila* group, but nevertheless without a larval organ, is a complex of species from India and surrounding countries (*S. championi* Dr., *edita* Dr. & Hoberl., *fletcheri* Dist., *pusana* Dist.).

***Saldula sibiricola* sp.n.**
(fig. 6f—n)

Description. — For measurements, see table 1. Medium-sized (4.3—5.7 mm), belonging to the *orthochila* group, very close to *S. nobilis* Hórvath, but with more extended testaceous elytral markings. Siberia.

Head: wide (0.7—0.8 × width of pronotum), shiny black, preocellar spot elongate triangular with longest side along eye; all mouth sclerites lightish in ♂, black in ♀ except for anteclypeus and labrum, which are sometimes fuscous; with shaggy adpressed lightish setae; postclypeus, frons and vertex also with many extending dark setae nearly as long as trichobothria; eyes with scattered short setae; rostrum dark brownish, reaching or slightly surpassing hind coxae. Thorax: black, shiny, with irregular golden pubescence and erect brown setae; pronotum narrow (ratio length/width 0.5 in submacropterous, 0.35 in macropterous specimens), lateral sides weakly concave, fore edges not much wider than the distinct collar; dome well-developed and elevated, reaching lateral sides, length medially $1.45 \times$ posterior part of pronotum; first acetabula entirely white, 2 and 3 with pale apex.

Wings: mostly submacropterous fore wings, hind wings reaching middle of membrane, one female macropterous, weakly shiny, with scattered golden recumbent setae on corium and veins of membrane; corium and clavus with dense pilosity of erect long brown setae (about

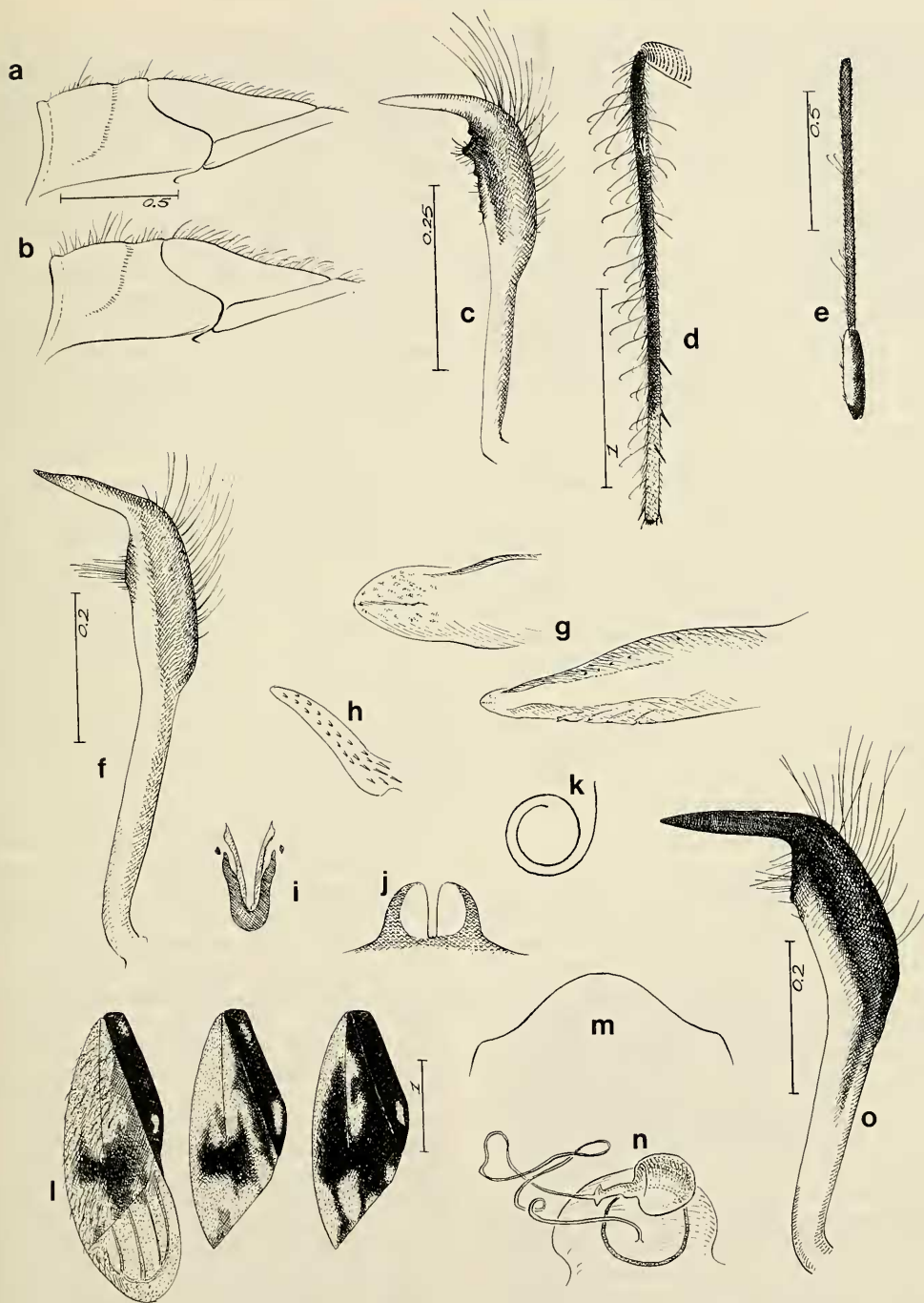


Fig. 6. a—c, *Macrosaldula* from Japan. a, *M. miyamotoi*, profile of pronotum and scutellum; b, idem of *M. shikokuana*; c, *M. miyamotoi*, paramere; d, e, hind tibia and antenna of *M. shikokuana*, respectively. f—n, *Saldula sibiricola*. f, paramere; g, apex of paramere; h, grasping plate of ♂; i, median endosomal sclerite; j, paramere; k, base of penisfilum; l, pigment variation of fore wing; m, outline of subgenital plate of ♀; n, gynatrium and spermatheca; o, *S. nobilis*, paramere.

0.2 mm long); ground colour testaceous, dark pigment brownish (variation, fig. 6l), three of the five specimens have a light proximal spot on the clavus; oblique hypocostal ridge present; membrane entirely light-coloured, basally with weak brown shade in dark specimens, veins light brownish.

Extremities: first two antennal segments shiny, yellowish, base of 1 sometimes darkened underneath, 3 and 4 black; segment 2 with obliquely extending brown pilosity, along the distal median side somewhat longer than diameter of segment, and with two dark, long setae medially at the middle (about 4 × longer than diameter of segment). Legs inclusive of coxae yellowish; flat sides of femora with some fuscous spots, apex of tibiae and last tarsal segment infuscate; short lightish pubescence, dark spines of third tibiae as long as diameter of tibia.

Other structures: abdomen dark brown, apex of sternites very narrowly pale; stigmata close to lateral margin of sternites; larval organ absent; distal prolongation of subgenital plate of female semicircular, whitish; male grasping plate, parandria, paramere and penisfilum as figured (fig. 6f—k, m, n).

Holotype (♂), length 4.3 mm, width 2.1 mm. Length and width of 3 submacropterous ♀ varying from 4.5—5.7 and 2.3—2.7 mm, respectively; of 1 macropterous ♀ 5.15 and 2.2 mm.

Material. — Holotype (♂), USSR, Transbaicalia, Kokuy, about 180 km ENE of railway station Urulga, 18.vi.1909, leg. A. Keller (in coll. Leningrad). Paratypes: idem 1 ♂ 1 ♀ (in coll. Wageningen); mountains SW of railway station Koltuma, Dzhungarski Alatau Mts, Kazakhstan, forest gorge, 1 macropterous ♀, 26.vi.1962, leg. G. Medvedev; 25 km ESE of Andreevka, Dzhungarian Alatau Mts, Kazakhstan, in a narrow forest along river, 1 ♀, 7.vii.1978, leg. I. Kerzhner; Otar, region of Verny (now Alma-Ata), 1 ♀, 29.vi.1922, leg. A. Reichardt; Temirtau, near Karaganda, 1 ♀, 11.vii.1961, leg. Asanova; river Tentek near Ursh-Aral, 1 ♂ 1 ♀, 9.vii.1978, leg. I. Kerzhner.

Comparative notes. — There are no clear-cut morphometric differences between *S. sibiricola* and *S. nobilis* (the paramere of *S. sibiricola* could be studied in only one ♂ available). The wing patterns are, however, so strikingly different that I am convinced, from my experience with other sibling complexes revealing fewer differences (Cobben, 1960, 1961, 1980a, b), that in the present case we are confronted with two reproductively isolated populations. I have seen

typical *S. nobilis* from Germany, Czechoslovakia, USSR, China and Japan. The material seen from Asia is as following (see map 1). USSR: Verkhnaya Mol'ka, Balagansk steppe, Irkutsk region, 1 ♂, 21.viii.1931, leg. Zakhvatkin; Igirma, Irkutsk region, 1 ♀, 17.viii.1966, leg. Zherikhin; Khabarovsk, 1 ♀, 18.vii.1931, leg. V. Pereleshina; Khabarovsk-Ussuri region, 1 ♂, 1.vii.1977, leg. K. Hürka; idem 3 ♂ 3 ♀, 3.vii.1977, leg. Štys & Davidová; idem 1 ♀, 8.vii.1977, leg. K. Hürka; idem, 3 ♂ 1 ♀, 1.vii.1978, leg. Štys & Vilimová; Mongolia, Baširet, 1 ♀, 7.viii.1974, leg. A. Seifert. China: Manchuria, 1 ♀, 25.vii.1943, leg. E. Kawase. I added on map 1 one locality in the Amur region and one in China (Kuku-nor lake); this material in the Leningrad collection has been checked by dr. Kerzhner (in litt.). Japan (new country record, formerly published as *S. scotica* Curt. by Hiura, 1967): Hokkaido, Kiyokawa near Ashoro, 2 ♂ 2 ♀, 7.vii.1958, leg. S. Miyamoto; Kutyaroko, 1 ♀, 11.viii.1937, leg. S. Asahina; Bekkai-mura, 1 ♀, 2.viii.1967, leg. T. Saigusa; Ataruma-dake, 1 ♀, 11.viii.1967, leg. A. Nakanishi.

Most of the material is semibrachypterous, some are submacropterous. The question of the status of *S. reuteri* Jak. must be considered here briefly. Jakovlev described this species from Siberia in 1889 without reference to *S. nobilis* described by Horváth five years earlier. Part of the type series of *S. reuteri*, available to me by the courtesy of Dr Kerzhner, conforms exactly with *S. nobilis*. *S. reuteri* was treated as a variety or a synonym of *S. nobilis* by most subsequent authors such as Drake & Hoberlandt (1951), Lindskog (1975), Vinokurov (1979a, b, c), but listed again as a species propria by Hoberlandt (1971b) from Mongolia without further comments.

All specimens of *S. nobilis* have a uniform, contrasting black-white wing pattern. The proximal basis of the clavus is black; rarely there is a very small white spot in the edge bordering the corium (just the opposite side in *S. sibiricola*, fig. 6i). The distal large white spot of the exocorium, which persists in all specimens of *S. nobilis*, presents a striking resemblance to *Teloleuca pellucens*. In contrast, the light colour of the corium of *S. sibiricola* is testaceous and the brown pigmentation is only vaguely indicated (fig. 6i). I dare to predict that specimens with darker patterns than drawn in fig. 6i, right, will eventually be found, and that their distal endocorial spot will be much more reduced than in *S. nobilis*.

The conclusion that *sibiricola* is a valid species and not just an ecotype, is further strengthened by the fact that the eight specimens originate from five different localities within an area of roughly 1200 km² between 70–95° longit., 55–40° latit. (see map 1). Its range is more or less surrounded by that of *S. nobilis* which extends from western Europe to eastern USSR and Japan. Although this distribution pattern suggests vicariance between both species, Dr Kerzhner wrote me that *S. sibiricola* apparently is a lowland species, in contrast to *S. nobilis*. All records of the new species originate from steppe or even semidesert regions outside the true mountainous regions, mostly at

altitudes between 100 and 400 m. *S. sibiricola* might be more thermophilous than *S. nobilis* which prefers damp situations at higher altitudes.

***Macrosaldula clavalis* sp.n.**

(fig. 7a–e)

Description. — For measurements, see table 1. Moderate size (4–5 mm), without erect long setae, pronotum with pale side margins, clavus with lightish basal stripe, wings extensively marked with light pattern, close resemblance to *M. kaszabi* (Hoberlandt, 1971). USSR.

M. clavalis sp.n. and *M. kaszabi* (Hoberlandt) can be distinguished as follows.

	<i>clavalis</i>	<i>kaszabi</i>
length of antennae in relation to width of head	2.2–2.3 ×	2 ×
ratio length antennal segments 3 + 4 to that of 2	1.25–1.4	1.2
ratio pronotum width/length	3.0–3.2	2.7
head and pronotum	shiny	dull
pubescence	short, not dense, golden	rather dense, silvery
mouthpart sclerites of ♀	predominantly dark, only mandibular plate and apex of anteclypeus lightish (fig. 7d)	lightish
wing margin	partly dark	entirely lightish
inner base of clavus	with longitudinal pale stripe (fig. 7a)	without basal stripe
tibiae	dark coloured except for subapical ring	lightish except for dark base and apex

Material. — Holotype (♂), USSR, Transcaucasia, Tshakvis-tavi, Adzharia, 15–20 km NE of Batumi, 21.vii.1949, leg. Kiritshenko (in Leningrad coll.). Paratype ♂, idem (in Leningrad coll.), 1 ♀, idem (in coll. Wageningen).

Comparative notes. — Both the new species and *M. kaszabi* (Hoberl.) share a pale dot at the origin of the middle cephalic trichobothria, pale acetabula and pale pronotal side margins. The gular plate of *M. clavalis* ♂ is of light colour. The paramere of *M. clavalis* has a longer process hamatus (fig. 7b, e) than in *M. kaszabi* as figured by Hoberlandt (1971 b, figs. 10, 11). The type locality of the new species in Georgia is about 4500 km west of the range of *M. kaszabi* in Mongolia. The differences with other *Macrosaldula* appear from the key to *Macrosaldula*

species presented below. Comments on the generic status of *Macrosaldula* are presented following the description of the next species, and on page 254.

***Macrosaldula inornata* sp.n.**

(figs. 8, 9 i–n)

Description. — For measurements, see table 1. Medium-sized (4.3–5 mm), slender, full-winged, short-haired, predominantly straw-yellowish, facies superficially *Pentacora*-like (fig. 8). Iraq.

Head: black, weakly shining, with recumbent silvery hairs; postclypeus, frons and vertex with ocelli flat; transverse swelling broadly developed above insertion of antenna; preocellar and frontolateral spots, border of upper notch of eye, transverse swelling, anteclypeus (except

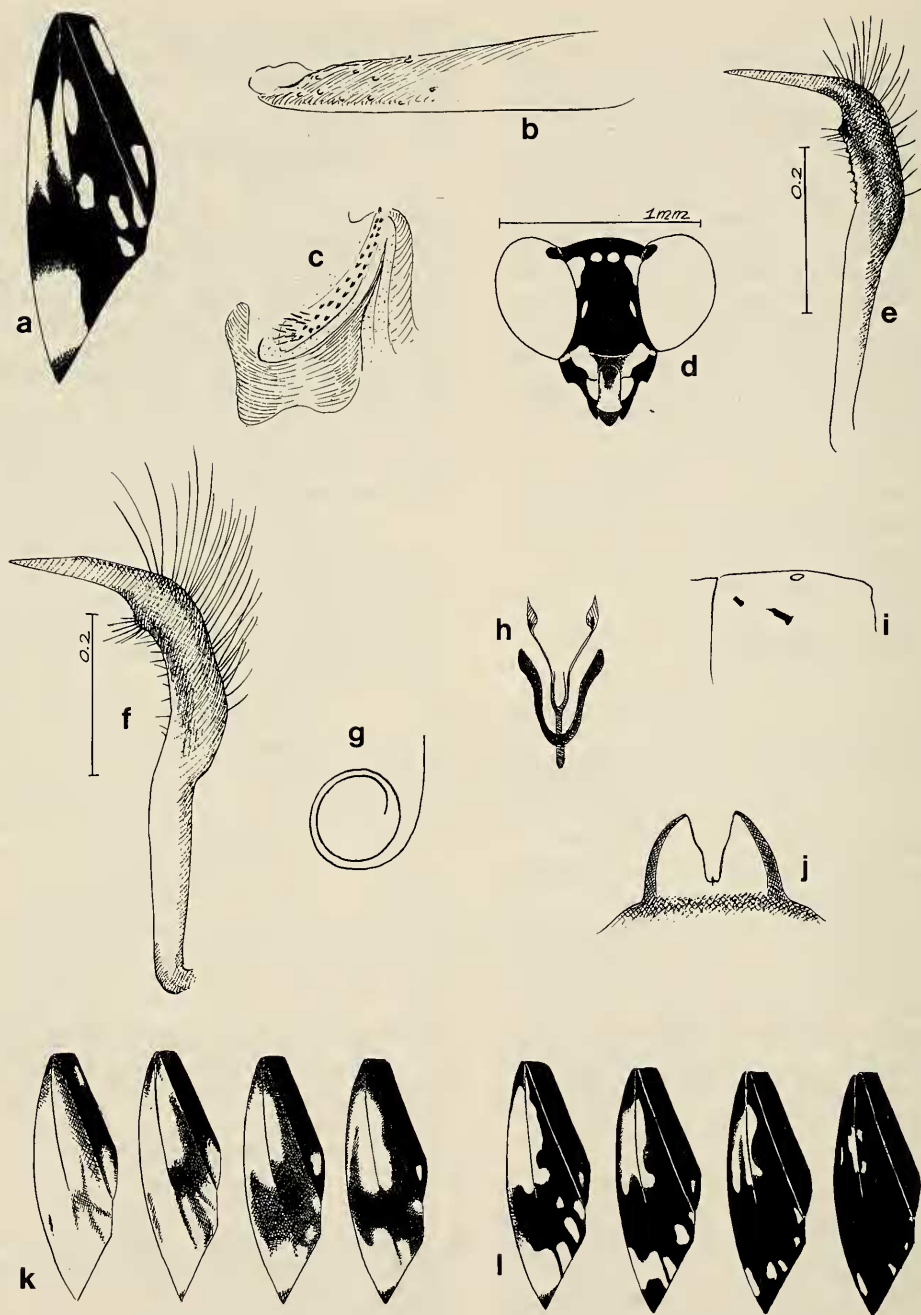


Fig. 7. a—e, *Macrosaldula clavalis*. a, corium and clavus of left fore wing; b, apex of paramere; c, male grasping plate; d, front view of head; e, paramere. f—k, *Macrosaldula koktshetavica*. f, paramere; g, base of penisfilum; h, median endosomal sclerite; i, rudiment of larval organ; j, parandria; k, pigment variation of corium and clavus. l, *Macrosaldula oblonga*, pigment variation of wing.

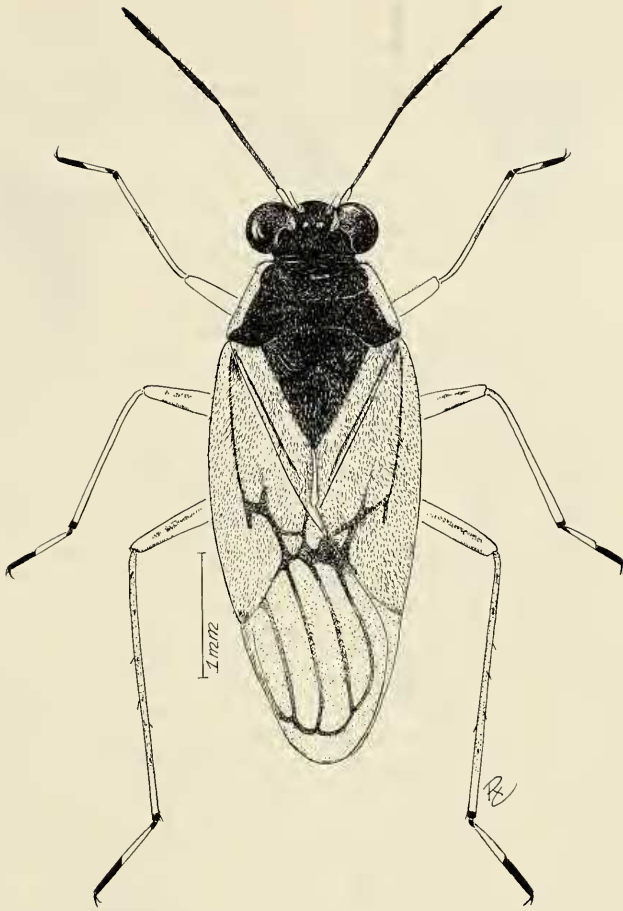


Fig. 8. *Macrosaldula inornata*, holotype ♂.

base), maxillary plate, gula and labrum yellowish; first visible segment of rostrum light, remainder dark brown, extending to middle coxae. Thorax: nearly dull, densely covered with recumbent golden pilosity dorsally and medium-long silvery hairs ventrally; pronotum trapezoid, with pale lateral margins, dome rather flat; acetabula light.

Wings: dull, with rather regular short, silvery pubescence, corium and clavus nearly unicolorous straw-yellowish, membrane slightly smoky; eight specimens have the lightest pattern as shown in fig. 8; in two males the dark design on the corium is only little enlarged, but the pale clavus tends to be broken up by pigment transversally in the middle; hypocostal lamina narrow, without oblique ridge; area of wing margin of female serving for attachment of male grasp-

ing plate nearly imperceptibly differentiated; hind wing nearly as long as forewing.

Extremities: antennae slender, only with very short hairs (except for the erect ones on 3rd and 4th segment); segment 1 stout, yellowish, 2 light brown, 3 and 4 dark brown; legs straw-yellowish, with brown patches as in fig. 8, coxae black with light apex; legs with very short silvery pubescence, spines on last tibia brown, not longer than diameter of tibia; tibia 3 weakly curved inwards.

Other structures: abdomen dark brown, distal margin of sternites light; rudiment of larval organ and sclerite of pregenital gland present; stigmata close to but not touching side margins of sternites; subgenital plate of female with black base and white, truncate distal prolongation (fig. 9k); ovipositor with eight teeth (fig.

9l); spermatheca asymmetrical, piriform; spermathecal duct gradually expanding and opening into spermatheca without a flange (fig. 9n). Male grasping plate with some 25 semi-long pegs; male genital structures as depicted in fig. 9i, j, m.

Holotype ♂, length 4.3 mm, width 1.7 mm. Length and width of 4 ♂ 4.3—4.5 mm and 1.7—1.8 mm, of 5 ♀ 4.7—5.0 mm and 2.0—2.1 mm.

Material. — Holotype (♂), Iraq (Sept.), Prov. Mosul, near Agra, Salta-ravin, 24.vi.1958, leg. R. Remane. Paratypes 4 ♂ 5 ♀, idem. Holotype and paratypes in coll. Wageningen, paratypes in Remane coll., Marburg, BRD. The species was collected together with *M. variabilis variabilis* (H.-S) in the same habitat: stones in and along mountain-river (altitude between 600 and 1000 m).

Comparative notes. — Reuter (1895, 1912) was the first to recognize a *scotica* species-group within *Acanthia* (= *Saldula*), which possibly might deserve the status of subgenus. He included in this group *S. jakovleffi*, *oblonga*, *rivularia*, *scotica*, *variabilis* and, with some reservation, *koreana* and *mongolica* not seen by him. To this group I added a new species from Spain (Cobben, 1959), characterizing the species-group by stout body dimensions, proportionally long antennae and the same type of median sclerotized structure of the penis. The taxon *Macrosaldula* was first informally introduced as a subgenus by Southwood & Leston (1959) in order to separate *S. scotica* (Curtis, 1833) from typical *Saldula* species, and formalized as such some years later (Leston & Southwood, 1964). The subgenus *Macrosaldula* subsequently was given generic rank by Wroblewski (1968) and Polhemus (1977). However, the antennal ratios given by Leston & Southwood to distinguish *Macrosaldula* from *Saldula* species are not at all exclusive, and certainly they are not exclusive from other genera. Awaiting a critical analysis of generic groupings (Cobben, in prep.), I provisionally follow the usage of recognizing a *Macrosaldula* clade, inclusive of the lapidicolous *M. inornata* described above. Although aberrant in the paucity of dark pigment, it shares with other *Macrosaldula* species the shape of the median endosomal sclerite (fig. 9j) and has the following plesiomorphous conditions in common: male grasping plate with oblong pegs and hairs, absence of the secondary ridge on the hypocostal lamina and absence of the spermathecal flange.

Lindskog (1975) suggested that also the Nearctic *Saldula andrei* Drake (= *S. azteca* Drake & Hottes) and *S. nigrita* Parshley belong in the *Macrosaldula* group, but these species do not reveal the combination of characters given above.

Macrosaldula kerzhneri sp. n. (fig. 10a, b, d—i, n)

Description. — For measurements, see table 1. Stout (5.9—7.2 mm), rather dull, erect semi-long pubescence, predominantly black with narrow testaceous seam along lateral wing margin (fig. 10i, n). USSR, Kazakhstan.

Since the general facies resembles a number of other dark-coloured species, only some main characteristics are mentioned here. The testaceous wing margin (fig. 10i, n) separates this species from all other congeners. The semilong setae (length subequal to diameter of hind tibia) on the wings and scutellum are dense, on head and thorax sparse. Dorsum in addition with a regular coat of short decumbent silvery hairs. All mouth sclerites entirely (♂) of partly (♀) yellowish. Antennae and legs predominantly blackish or dark brown, light-dark pattern as in most other species; first antennal segment of ♂ testaceous on inner side. First acetabula entirely and second and third apically yellowish. Male genital structures as drawn in fig. 10a, e—h. Male grasping plate with about 20 elongate pegs and some stiff setae medially (fig. 10b).

Material. — Holotype (♂), S. Kazakhstan, 20 km N of Kentau, Karatau Mts, 27.v.1966, leg. Arnoldi (in coll. Leningrad). Paratypes, 2 ♀, idem, 26.v.1966, leg. Kerzhner; 1 ♀, 24.v.1966, leg. Gurjeva; 1 ♀, Atshisay, river Teresakan, Karatau Mts, 31.v.1936, leg. Lukyanovitch. For the location of sampling sites, see map 2.

Comparative notes. — The wing pattern with the neatly parallel ochreous costal margin and the pale first acetabula separates *M. kerzhneri* from other species with a more or less dense pubescence. To these belong *M. scotica*, *madonica* and *tadzhika* in which, moreover, the setosity extends laterally beyond the pronotal margin. The paramere without distinct processus sensalis and slender, sharp processus hamatus (fig. 10e, f) and the male grasping plate with two rows of pegs (fig. 10b) differs from those in *M. scotica* (fig. 10j—m and 10c). Further differences between *M. kerzhneri* and all other related species can be extracted from the key to *Macrosaldula* species.

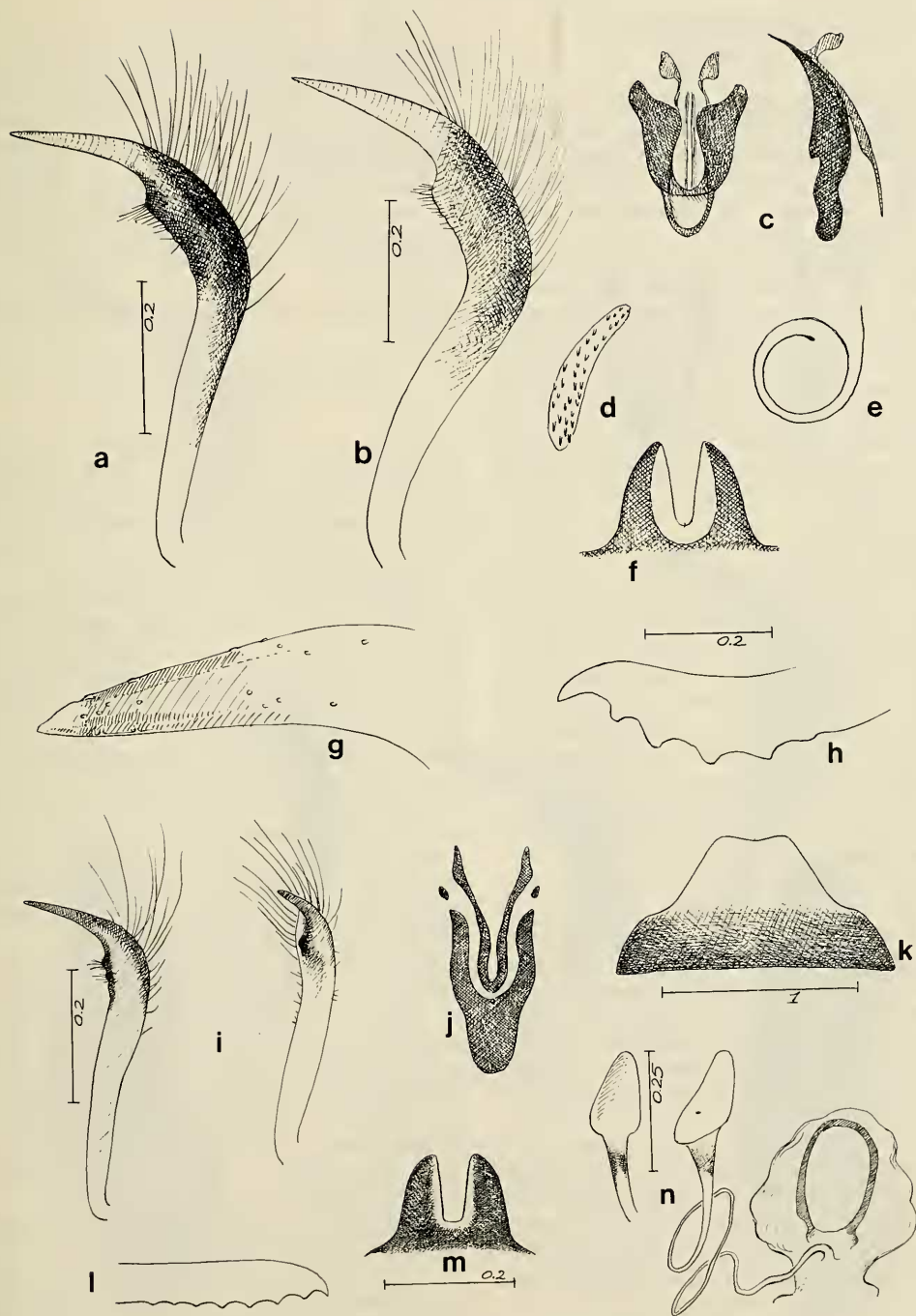


Fig. 9. *Macrosaldula* species. a—h, *M. koreana*; a, b, paramere; c, plane and side view of median endosomal sclerite; d, grasping plate of ♂; e, base of penisfilum; f, parandria; g, apex of paramere; h, sawing blade of ovipositor. i—n, *M. inornata*. i, paramere, plane side and inner view (right); j, median endosomal sclerite; k, female subgenital plate; l, sawing blade of ovipositor; m, parandria; n, gynatrium with ring gland and spermatheca.

Macrosaldula koktshetavica sp.n.

(fig. 7f—k)

Description. — For measurements, see table 1. Medium-sized (4.3—5.5 mm), full-winged, weakly shiny, yellowish brown, exocorium, legs and acetabula predominantly light-coloured, with short adpressed and semilong erect pubescence. USSR, Kazakhstan.

Head: black, weakly shiny, sparse silvery pubescence, several erect dark setae on frons and vertex in addition to the six trichobothria; pre-cellular spot, mouth sclerites and gula yellowish in both sexes; rostrum dark-brown, except for first short visible segment, extending in between middle coxae. Thorax: black, shiny, with rather dense silvery or golden pubescence and scattered semi-erect, semilong setae; first acetabula broadly and other acetabula narrowly margined with pale colour.

Wings: weakly shiny, pubescence as on thorax; colour pattern not very contrasting, eunomy as in fig. 7k (based on 38 specimens); the spreading of dark pigment starts from the exocorium, but the edge of the outer wing margin is always narrowly brown even in the pale specimens; in the lightest extreme the inner base of the clavus bears a narrow pale spot; the dark extreme approaches the general wing pattern of *M. oblonga* (fig. 7l); membrane for the major part light-greyish, also in darkest specimens, veins light-brown; hypocostal lamina narrow, without oblique ridge.

Extremities: first segment of antennae black ventrally, yellowish dorsally, other segments dark brown, the very base of second lightish; pubescence very short, all segments with some erect semilong dark setae. Legs predominantly yellowish, underside of femora dark brown, flat sides with some fuscous spots, apex of tibiae and last tarsal segment brownish, pubescence very short, dark spines of hind tibia almost as long as diameter of tibia.

Other structures: abdomen brown, distal margin of sternites lightish; distal prolongation of subgenital plate of female truncate, white. Male grasping plate with short pegs and spinous setae in the median edge. Base of penisfilum with nearly two coils (fig. 7g). Parandria, paramere, and endosomal sclerite as in fig. 7j, f, h.

Holotype (♂), length 4.3 mm, width 1.9 mm. Length and width of ♂ varying from 4.3—4.7 and 1.8—1.9 mm, respectively; of ♀ from 5.0—5.5 and 2.1—2.3 mm, respectively.

Material. — USSR, holotype (♂), Borovoe, Koktshetav region, Kazakhstan, 27.vi.1932, leg. V. Popov (in coll. Leningrad). Paratypes: 5 ♂ 17 ♀, idem; between Stshutshinsk and Barmashi, Koktshetav region 8 ♂ 9 ♀, 4 larvae, 23.vi. and 1—2.vii.1982, leg. Filipyev (in coll. Leningrad, coll. Wageningen). Additional 50 specimens, not seen by me, from both localities are in the Leningrad Museum. Dr Kerzhner informs me that the Koktshetav Hills form an isolated mountain-massive in North Kazakhstan, surrounded by steppes and covered by birch and pine forests.

Comparative notes (see key to *Macrosaldula* species).

Macrosaldula miyamotoi sp. n.

(fig. 6a, c; 14 f)

Description. — For measurements, see table 1. Medium-sized (4.4—5.7 mm), slender, macropterous, predominantly black with short and semilong pilosity, corium mostly with rather contrasting yellowish markings (fig. 14f), membrane dark smoky. Japan.

Head: black, with erect black setae somewhat shorter than trichobothrial setae; lightish pre-cellular spots large, broadly touching eye and nearly extending to ocellus; mouthpart sclerites yellowish in male, base of anteclypeus, median part of transverse swelling and margins of labrum darkish, in female maxillary plate in addition black; gula black; rostrum dark brownish, reaching hind coxae. Thorax: shiny black with sparse short adpressed golden pubescence, in addition dorsally with erect semilong and a few long dark setae (fig. 6a), which extend from straight lateral margin of pronotum; acetabula black, rarely with light margin.

Wings: scattered short golden setae, numerous dark erect semilong setae with curved apex; eunomy of weakly shining forewings as depicted (fig. 14f); yellowish spots rather contrasting with black ground-colour (less in specimens of Ohshimizu), dark area of distolateral part of endocorium deeply black; pale stripe in proximal base of clavus rarely present; membrane predominantly fuscous also in light-coloured individuals.

Extremities: Antennal segments dark, first segment medially with pale line, 2 with short setae. Legs predominantly dark-coloured, pubescence short; trochanters, upper and underside of femora and often subapical ring of tibiae and second tarsal segment lightish.

Other structures: caudal extension of female subgenital plate truncate, white; paramere as in fig. 6c.

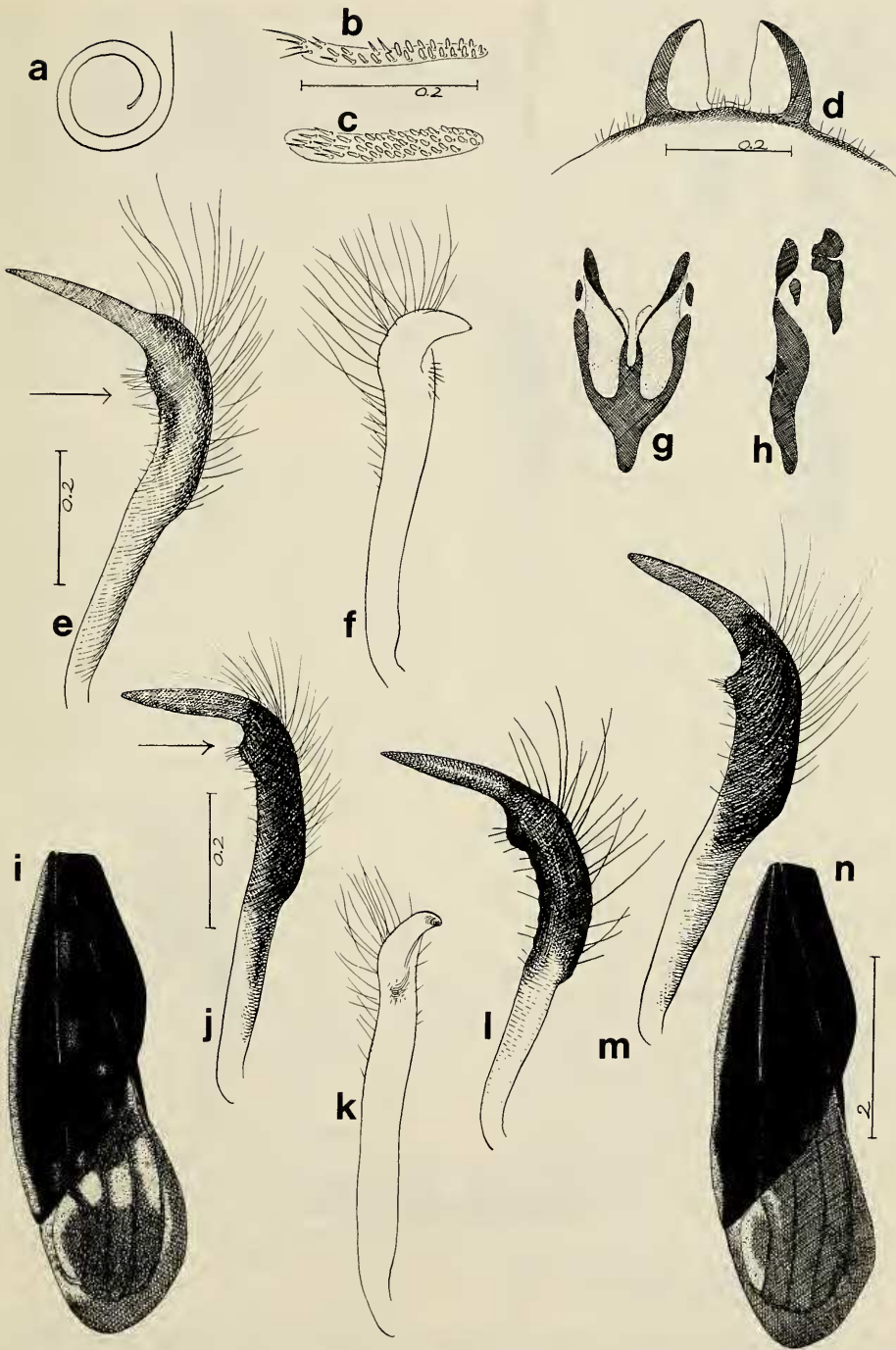


Fig. 10. *Macrosaldula*. a, b, d—i, n, *M. kerzhneri*. a, base of penisfilum; b, grasping plate; d, parandria; e, f, paramere, f, viewed in direction of arrow in fig. e; g, h, median endosomal sclerite, plane and lateral view, respectively; i, n, left fore wing. c, j—m, *M. scotica*. c, grasping plate; j—m, parameres of specimens from the Netherlands (j, l) and Austria (m).

Holotype (♂), length 4.9, width 1.9 mm. Length and width of 12 ♂ varying from 4.4—5.0 mm and 1.9—2.0 mm, respectively; of 8 ♀: 5.3—5.7 and 2.3—2.5 mm.

Material. — Holotype (♂), Japan, Honshu, Nagano Pref., Kamikochi, 10.ix.1951, leg. H. Hasegawa (in coll. Wageningen). Paratypes: Idem 1 ♀; Honshu: Nagano Pref., Todai, S. Alps, 1 ♂ 1 ♀, 12—14.viii.1978, leg. M. Satō; Gifu Pref. Oppara, 9 ♂ 3 ♀, 15.vi.1978, leg. M. Satō; Meoto waterfall, Takasu Village, 12 ♂ 3 ♀, 11.viii.1980, leg. J. T. Polhemus & M. Satō; Okumino, Hirugano Heights, 5 ♂ 1 ♀, 12.viii.1980, leg. J. T. Polhemus & M. Satō; Izu Peninsula, Nikai-daru Falls, 5 ♂ 3 ♀, 29.ix.—3.x.1980, leg. M. Tomokuni; Izu Peninsula, Yagashima-cho, Kanogawa River, 4 ♂ 5 ♀, 3.x.1980, leg. M. Tomokuni; Miyagi Pref., Futakuchi, Natori-gun, 1 ♀, 20.viii.1977, leg. M. Tomokuni, Toogatta, 1 ♀, 19.viii.1977, leg. M. Tomokuni; Shosenkyo Kai, 1 ♂ 1 ♀, 11.viii.1959, leg. S. Miyamoto; Yamanashi Pref., Masutomi, 1 ♂, 25.vii.1963, leg. T. Saigusa; Gumma Pref., Oze, 3 ♂ 2 ♀, 5.ix.1952, leg. H. Hasegawa; Ohshimizu, Oku-Nikko, 3 ♂ 4 ♀, 18.vii.1940, leg. M. Hanano; Kyushu: Chikushi-Yabakei near Fukuoka, 2 ♂, 30.ix.1956, leg. S. Miyamoto; Ino near Fukuoka, 1 ♂ 2 ♀, 14.vii.1965, leg. S. Miyamoto; Fukushima, Chikugo, 1 ♂, 26.viii.1952, leg. S. Miyamoto; Fukagoya, Chinugo, 1 ♀, 6.vii.1952, leg. S. Miyamoto; Yakushima, Miyanoura, 1 ♂, 29.viii.1953, leg. Takeya & Hirashima. (Paratypes in coll. of Hasegawa, Miyamoto, Polhemus, Jap. Nat. Museum, Kyushu Univ. and in coll. Wageningen).

Comparative notes. — This species is apparently widely distributed along stony banks of rivers on the southern main islands of Japan. The lightest coloured specimen (fig. 14f) comes from Yakushima, a small island close to the southern coast of Kyushu. Colour-intermediates with dark coloured specimens occur without any morphological differences on Honshu. *M. miyamotoi* and the related *M. shikokuana* from Japan, described below, are close to continental *Macrosaldula* species of the *oblonga* group. Their eunomy, however, is marked by the absence of the light spot on the proximal part of the endocorium, even in the palest specimens (compare fig. 14f with figs. 7i, 14d, e).

***Macrosaldula oblonga acetabularis* subsp. n.**
(fig. 12f)

Separable from the nominate form *oblonga* Stål, 1858, by the entirely whitish first acetabula (always black in the long series of typical *oblonga* which I have seen). In two of the four specimens of the new subspecies the second ac-

etabula have a pale margin. The ratio length antenna/width pronotum in two males of subsp. *acetabularis* is 1.64—1.74, and in 10 males of subsp. *oblonga* 1.85—1.90. These ratios could not be checked for females, since the single female of *acetabularis* has incomplete antennae. The parameres of two males of the new subspecies have a straight processus hamatus (fig. 12f), whereas this is slightly curved upwards in subsp. *oblonga* (fig. 12a).

Material. — 3 ♂ 1 ♀, Zaisan, river Karasu, E. Kazakhstan 20.vi.1965, leg. J. Sukatshva (holotype ♂ in Leningrad coll., others in Popov coll. (Moscow), coll. Wageningen). This subspecies was collected simultaneously with *M. jakovleffi* Reut.

Comparative notes. — The locality of this subspecies is about 500 km outside the presently known range of the nominate form (see map 2). The distribution pattern of *M. oblonga oblonga* covers the mountainous regions of Mongolia and Transbaical between 90 and 118 degrees of longitude, that is about 2000 km. The altitude of the type locality of *M. oblonga acetabularis* west of this range is not mentioned, but it may be lower than where the nominate form occurs. According to Hoberlandt (1971b), the occurrence of the nominate subspecies in Mongolia is between 1200 and 2100 m.

***Macrosaldula shikokuana* sp. n.**
(fig. 6b, d, e)

Very similar to *M. miyamotoi* in dimensions (table 1) and coloration, differing only in the much longer pilosity. Second antennal segment with a few erect semilong setae along the median side (fig. 6e). Erect hair-dress on dorsal side more conspicuous and somewhat longer than in previous species (fig. 6b), laterally extending over a distance of 0.23 mm beyond the margin of the pronotum. Tibiae with silvery adpressed pubescence and erect brown setae which are longer than the diameter of the tibia; the distribution and length of these curled setae on the hind tibiae are indicated in fig. 6d. The male paramere is much like in *M. miyamotoi* (fig. 6c). The wing patterns of the holotype and paratype are more or less like fig. 14f, right.

Holotype (♂), Japan, Shikoku, Omogo, Iyo, 14.vii.1952, leg. T. Ishjara & S. Miyamoto. Paratypes: idem, 3 ♂ 3 ♀ (holotype and paratypes in Jap. National Museum, Tokyo; paratype in Polhemus coll., Englewood).

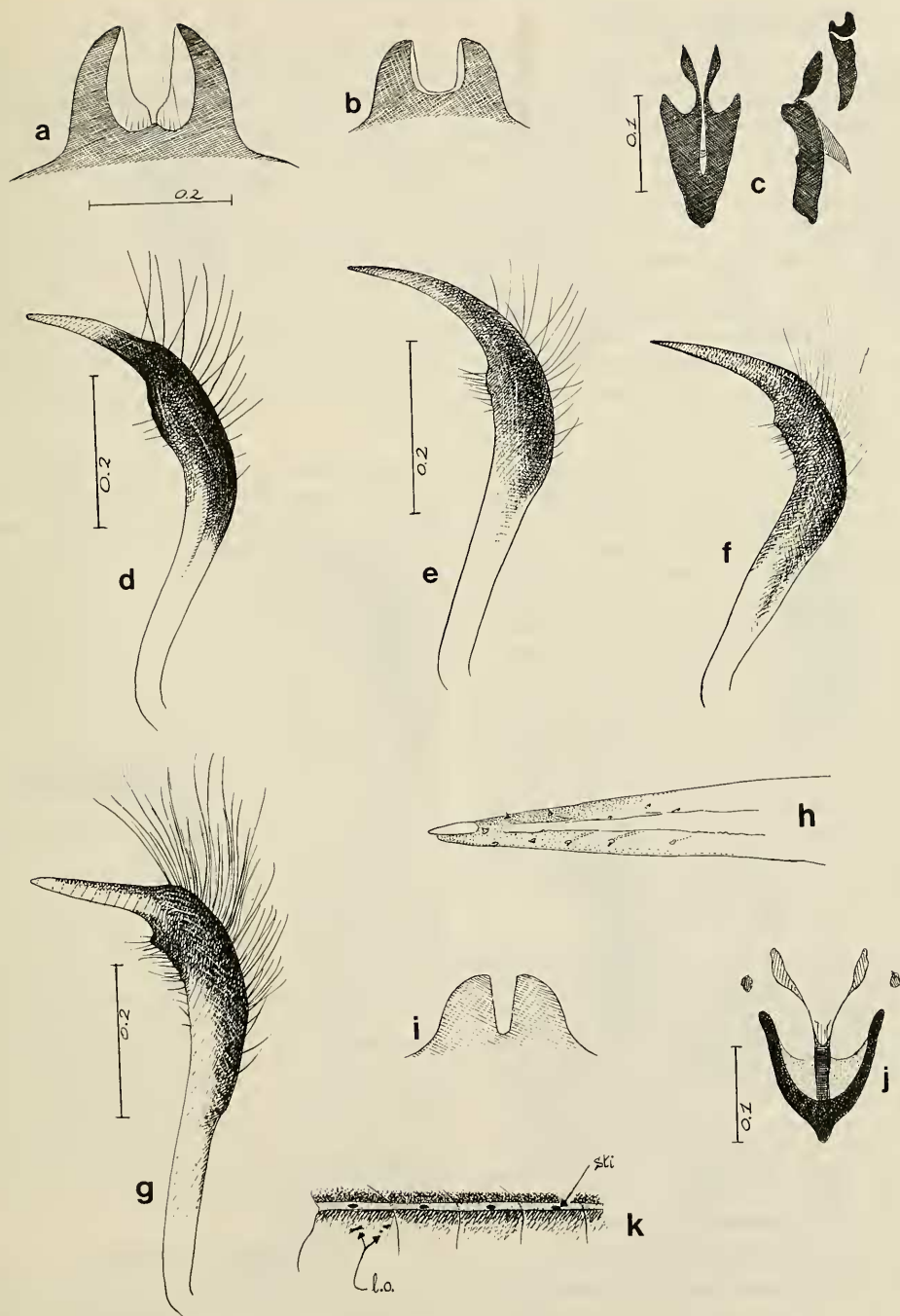


Fig. 11. *Macrosaldula* species. a, *M. simulans*, parandria; b, *M. rivularia* from Mongolia, parandria; c, idem, left, median endosomal sclerite, plane side; right, left view of median and lateral endosomal sclerites; d—g, parameres; d, *M. monae*; e, f, *M. rivularia*, Mongolia; h, apex of paramere of *M. rivularia* from Alaska; i—k, *M. violacea*; i, parandria; j, median endosomal sclerite; k, side view to show the placement of stigmata in between sternites and tergites.

Macrosaldula simulans sp. n.

(fig. 11a)

Description. — For measurements, see table 1. Stout (6.3—6.9 mm), unicolorous dullish black species with short silvery recumbent setae; very close to *M. rivularia*, Sahlb. East-USSR.

The most reliable distinguishing characters with *M. rivularia* are as follows: middle pair of cephalic trichobothrial setae not originating from light spot (such a spot is present in all specimens of *M. rivularia* I have seen from Siberia and Alaska, and also in the Alaskan *M. monae* Drake), and proportionally longer antennae and legs. The ratio antennal length/head width is 2.73—3.06 in *M. simulans* (n = 8) and 2.12—2.4 in *M. rivularia* (n = 8). The ratio length of third tibia/head width amounts to 2.55—3.03 and 1.91—2.21, respectively. These ratios could be influenced by allometry of the appendages because the new species is on the average larger (6.3—6.9 mm) than *M. rivularia* (4.4—6.5 mm). However, the discrepancies of the ratios between the two species remain as striking in specimens of equal size. *M. simulans* differs further weakly in having a somewhat more dull pronotum, dark anteclypeus (also in the male), inner side of first antennal segment weakly lightish in male, entirely dark in female. Genital structures are similar to *M. rivularia*, but the parandria of the holotype of *M. simulans* reveals a small median process (fig. 11a), which lacks in *M. rivularia* (fig. 11b). Additional material is needed to check whether this is a constant feature of difference.

Holotype (♂), USSR, river Buren, near Ilyinka (Bulun-aksky), (Tuva region), 14.vi.1949, leg. Perevoztshikova, in Leningrad Museum. Paratypes: USSR: 1 ♀, Krasnoyarsk, 3.viii.1924, leg. Vinogradov; 1 ♀, Kultuk, near Baikal Sea; 1 ♀, Tunka, along river Irkut, about 180 km W-SW of Irkutsk, 20.vii—10.viii.1911, leg. C. Ahnger, collection of Rodionov; 1 ♀, coast of Baikal Sea near Tolsty Mys, village Sukhoy, vii.1928, leg. Vereshchagin & Tikhomirov; 1 ♀, Baikal, delta of the river Selenga, near the Proval bay, 12.vii.1925, leg. Vereshchagin & Tikhomirov; 1 ♀, Kuznetsk basin (Kemerovo Prov.), river Suriekovaya, 2.viii.1951 (in coll. Leningrad and Wageningen).

Additional material not seen by me.

After reading my manuscript Dr P. Lindskog wrote me that he had examined an apparently undescribed species from a collection of Saldidae from Mongolia, which appears to fit the description of *M. simulans*. The specimens concerned were attributed to *M. rivularia* by Hoberlandt (1971b); they were collected in a small mountain range in NW Mongolia, SE Uvs-

Nuur. The locality label reads as follows: Uvs Aimak, Somon Öndörchongaj, 1900 m, loc. 1090, 3 ♂ 2 ♀, 11.viii.1968, Exp. Dr Z. Kaszab, 1968. Dr I. Kerzhner tested my key and could trace additional material of *M. simulans* in the Leningrad Museum. These data, which are also plotted on map 2, are as follows: W. Siberia: Bayan-Ölgiy aimak, river Ikh-Dzhargalantyn-Gol, 20 km NW of Bulgan, 1 ♂ 2 ♀, 23—24.vii.1978, leg. Gurjeva; same aimak, river Dzhangyz-Agatsh-Gol, 15 km SE of Delun, 21.vii.1978, 6 ♂ 8 ♀, leg. Gurjeva; Bayan-Khongor aimak, river Tuin-Gol, 10 km S of Erdene-Tsogt, 7 ♂ 16 ♀, 25.viii.1978, leg. Gurjeva. Mongolia: Dzabkhan aimak, Dzegistay pass, 1 ♂, 23.ix.1926, leg. Kiritshenko (as *M. rivularia* in Vinokurov 1979b); Ara-Khngai aimak, confluence of Sumiyn-Gol and Tshulutyn-Gol, 5 ♂ 7 ♀ (together with *M. rivularia*), 29—30.vi.1975, leg. Gurjeva & M. Kozlov.

Comparative notes. — The distribution of this new taxon (see map 2) supports the view that *M. simulans* warrants the status of species, distinct from *M. rivularia*. The latter species has been recorded from Siberia (even from the extreme north near the delta of Enisey), Mongolia (Hoberlandt, 1971), and Alaska. I saw additional material of *M. rivularia* in the Leningrad collections from the following localities: Mountain Pektusan, North Korea, 10 spec., 21.viii.1950, leg. Borkhsenius; Omsuktshan, Kolyma, 1 ♀, 27.viii.1953, leg. Kurnakov; river Ebeten, 10 km SW from Kuysyur near Lena, Yakutia, 2 ♀, 10.vii.1957, leg. Gorodkov. Mongolia, Urga (Ulan-Bator), 7 spec., 4.vii.1926, leg. Kiritshenko; idem, 11 spec., 25.vi.1928, leg. A. Ivanov; Urga, coast of river Tola, a long series, 25.vi.1928, leg. A. Ivanov; Över Chngai-aimak, Orchon waterfall, 2000 m, 1 ♂, 14.vii.1965, leg. Muche (labelled as *mongolica* Kir.). The presently known distribution of *M. rivularia* is shown on map 2. Future collections may perhaps reveal that the ranges of both species overlap partly. Within the genus *Macrosaldula*, *M. simulans*, *M. rivularia* and the Alaskan *M. monae* form a separate unit, characterized by a similar median endosomal penis sclerite (fig. 11c); this sclerite is more slender in all other *Macrosaldula* species (fig. 10g).

Macrosaldula violacea sp. n.

(fig. 11 i—k)

Description. — For measurements, see table 1. Rather large (5.2—7.0 mm), slender, more or less parallel-sided, glossy black with metallic-violet shine, wings inclusive of clavus and membrane entirely immaculate, antennae and legs predominantly dark brown, pubescence very

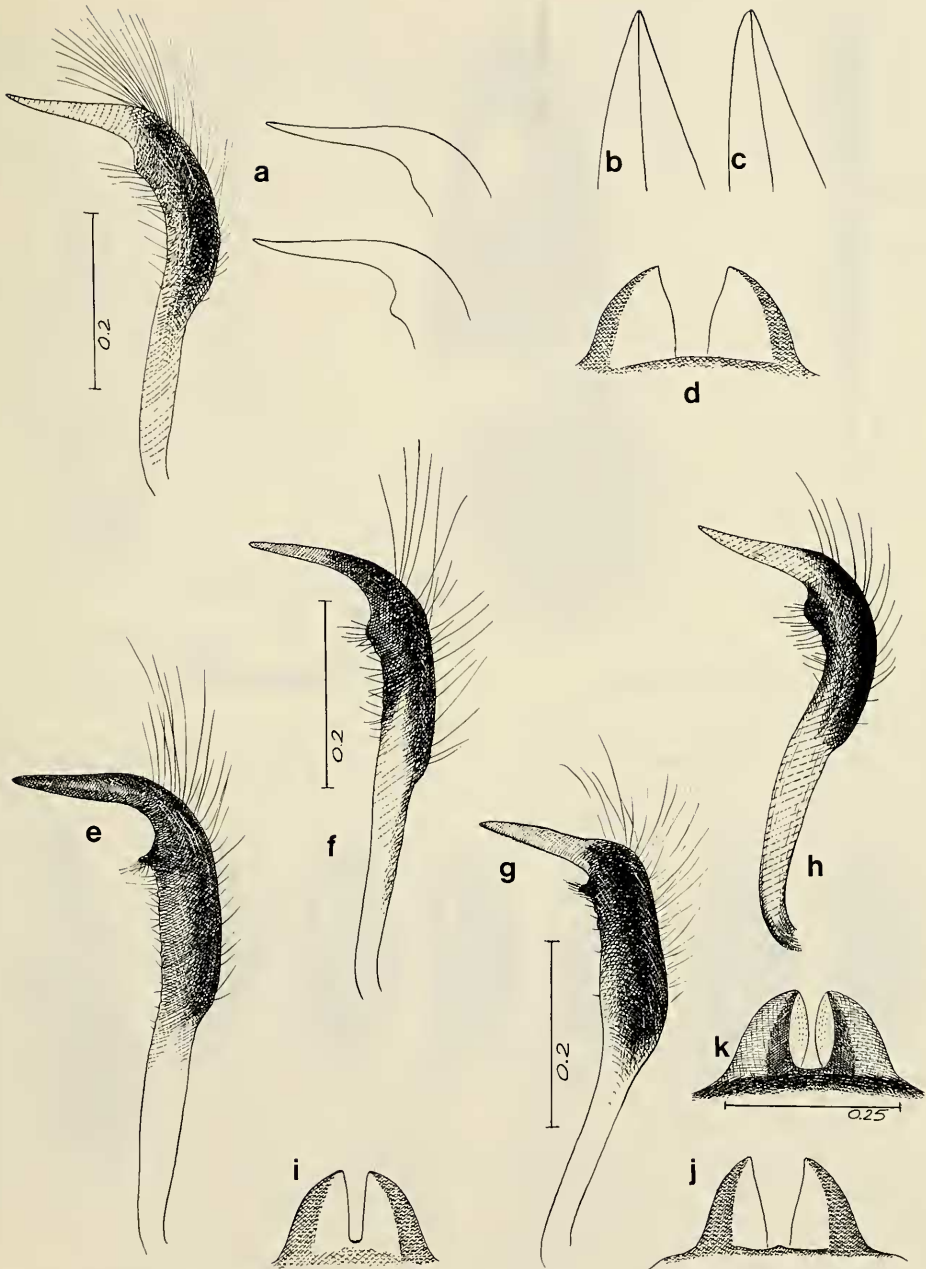


Fig. 12. *Macrosaldula* species. parameres (a, e—h), parandria (d, i—k), base of fore wing (b, c). a, d, *M. oblonga*; b, most *Macrosaldula* species; c, *M. variabilis*; e, i, *M. madonica*; f, *M. oblonga acetabularis*; g, k, *M. nivalis*; h, j, *M. jakovleffi*.

short and sparse. Far East of the USSR, Japan.

This unicolorous black species is very close to *M. koreana* (Kiritshenko, 1912a). The differences are tabulated as follows.

Alaska. This species is smaller (4.5—6.4 mm), rather dull, and bears a thick, somewhat shaggy, pubescence of semilong silvery hairs. The second dull-blackish species, *M. simulans*, has just

	<i>violacea</i>	<i>koreana</i>
size	in general somewhat smaller, particularly the material from Japan which ranges from 5.2—6.0 mm (n = 8)	in general somewhat larger, 6.3—7.3 mm (n = 20)
ratio pronotum length/width	2.7—3.0 (n = 5)	2.4—2.55 (n = 5)
ratio antennal length/head width	2.6—2.7 (n = 5)	3.0—3.1 (n = 5)
upper side	strongly shining, with blue-violet colour	less obviously shining, sometimes with faint bluish reflection
hair covering	short, less dense	slightly more dense (this character can only be evaluated by simultaneous comparison of both species)
colour	♂ inner side of first antennal segment, transverse swelling above anteclypeus, anteclypeus and maxillary plates yellowish ♀ all these parts black, transverse swelling and maxillary plate sometimes partly black	always entirely black, as in ♀ always entirely black, as in ♂
paramere	fig. 11g	regularly curved (fig. 9a, b)

Other less readily visible characters reveal a greater discrepancy between both species. Whereas the abdominal stigmata in *M. koreana* have a normal position on the sternites, those of *M. violacea* are located in the lateral connexival membrane (fig. 11k). The median endosomal sclerite of *M. violacea* (fig. 11j) resembles that of typical *Macrosaldula* species, while *M. koreana* fig. 9c) in this respect more resembles *M. rivularia* (fig. 11c).

Holotype (♂), Japan, Honshu, Izumi Tamagawa, Tokyo, 24.vi.1951, leg. H. Hasegawa (in coll. Wageningen). Paratypes: 8 ♂ 4 ♀, idem; Honshu, Onikobe, Miyagi, 1 ♂ 12.viii.1977, leg. T. Nambu; Hokkaido, Matsuneshiri, Nakatonbetsu, 12 ♂ 1 ♀, 26.viii.1977, leg. M. Tomokuni; USSR, 29 specimens, Vinogradorka, Primorskiy Kray, 9 and 14.vii.1929, leg. Kiritshenko; 1 ♀, river Sitsa (now Tigrovaya), Sutshan (now Partizansk) district, Primorskiy Kray, 18.vii.1926, leg. Rostovkykh; 1 ♂, river Sudzukhe (now Kievka), 7.vii.1948, leg. Sharov. Paratypes in Leningrad coll., coll. Kyushu Univ., coll. Hasegawa, Linnavuori, Polhemus, and Wageningen.

Comparative notes. — Both *M. violacea* and *M. koreana* cannot be confused with other members of this genus. The only known entirely black species of the *Macrosaldula* group is *M. rivularia* (Sahlb., 1878) from Siberia and

been described above. So far the scarce data suggest (see map 1) that *M. violacea* may be distributed on the mainland and islands around the Sea of Japan. The continental localities all lie north of Korea. Of *M. koreana* I have seen additional material from localities at roughly 1500 km NW of Korea (coast of the river Shilka, Sretensk, Transbaicalia, 3—19.vii.1928, leg. Kapustin; of the large species in the Leningrad coll. I have studied 23 ♂ and 14 ♀). Other localities of *M. koreana* (1 ♀, River Koppi, 52 km W of Mouth, Sikhote-Alin Mts, 20.viii.1924, leg. Emelyanov; 2 ♀, Imperatorskaya Gavan' (now Sovetskaya Gavan'), Khabarovsk region, 23 and 26.vii.1916, leg. N. Krylov) lie north of Korea and thus overlap the distribution of *M. violacea*. It is uncertain whether *M. koreana* occurs in Japan. Earlier records from Honshu (Hasegawa, 1960) may probably refer to *M. violacea*.

Calacanthia grandis sp. n. (figs. 15d, 17d)

Description. — For measurements, see table 1. Large (single ♀ measures 7.5 mm) with proportionally long antennae; dull, black with small testaceous wing spots, adpressed short lightish setae and some erect dark setae on head and pronotum; superficially resembling *Chilox-*

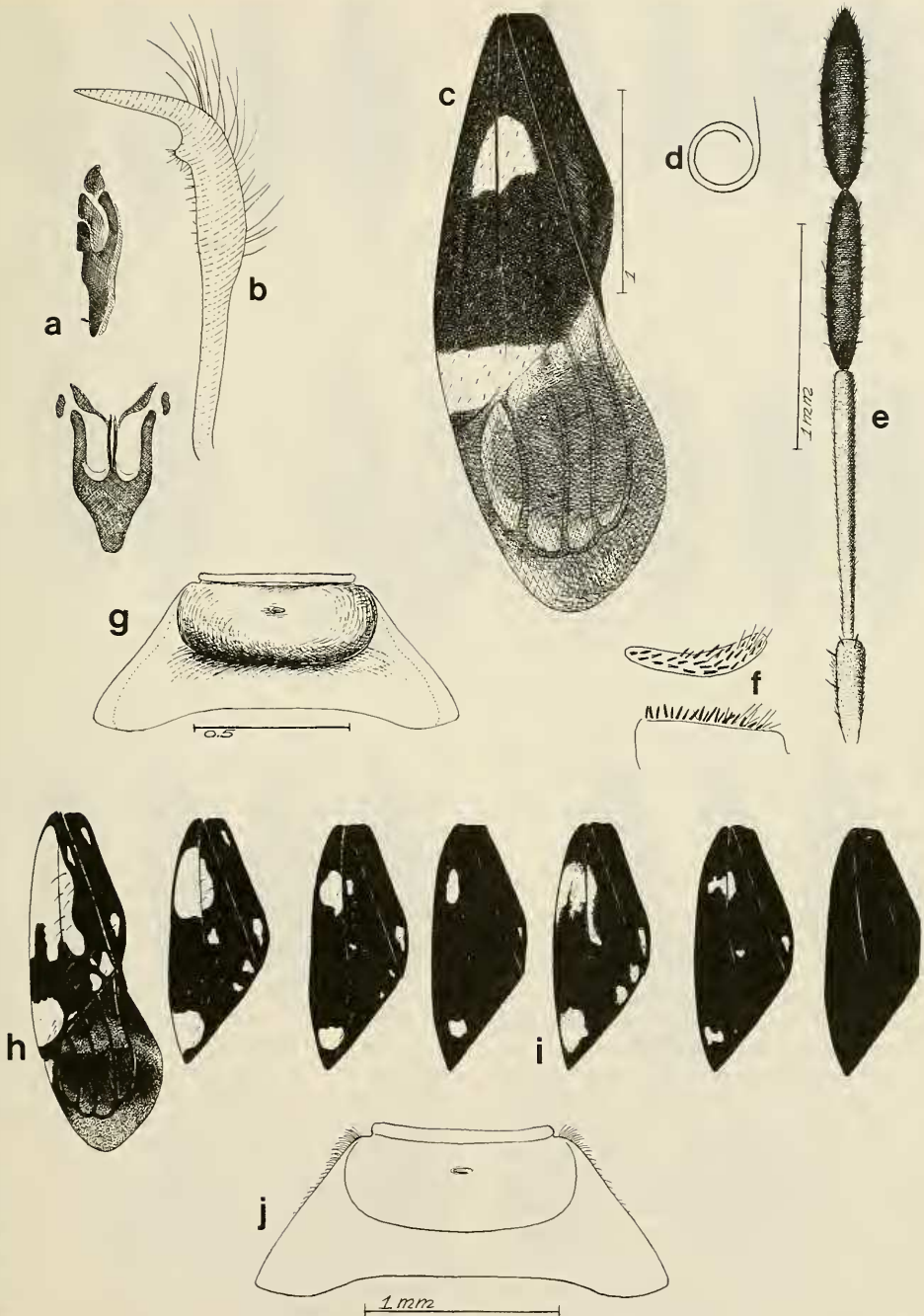


Fig. 13. a—g. *Macrosaldula roborowskii*. a, median endosomal sclerite, plane view (below), lateral view (above); b, paramere; c, left fore wing; d, penisfilum; e, right antenna; f, male grasping plate; g, pronotum. h, i, *M. variabilis*, eunomy of left fore wing; h, *variab. connectens*; i, *variab. variabilis*. j, *M. jakovleffi*, pronotum.

anthus species from the Himalaya or large-sized dark *Macrosaldula* species. China.

Head: dull, black inclusive of mouth sclerites, basal half of labrum brownish; preocellar spot through narrow testaceous band along eye margin connected with pale spot bearing frontal trichobothrial setum; setosity short, golden, adpressed, and with scattered erect dark setae as long as the six trichobothrial-like setae. Thorax: Pronotum 2.6 times wider than long medially, side margins almost straight; frontal edges protruded laterad, much wider than pronotal collar; callus rather flat, not reaching side margins, central pit transverse, with smaller pit left and right, posterior lobe of pronotum medially half the length of callus; rather densely covered with short adpressed golden setae and with few erect dark setae; black, pronotal lateral margin very narrowly testaceous; acetabula 1 and 2 entirely lightish, 3 only apically.

Wing of single specimen macropterous (fig. 15d); exocorium subbasally foliaceous, somewhat wider than base of endocorium, hypocostal lamina well-developed, without secondary ridge; margin of wing slightly infolded at the small polished area which is adapted to receive the coupling plate of the male; corium dull, black with seven testaceous spots (fig. 15d), clavus entirely black; membrane ochreous, veins brown, cells with brownish markings; short silvery pubescence of corium moderately dense, somewhat shaggy.

Extremities: Antennae long, ratio of segments: 1 : 2.41 : 1.40 : 1.57; segment 2 cylindrical (♀), thickness 0.4 times diameter of segment 1; all segments dark-brownish, with short adpressed silvery setae, segment 1 in addition with semilong dark stiff setae along median side, segment 2 with some scattered semilong setae which are slightly longer than diameter of segment, erect setae on segments 3 and 4 approximately as long as the diameter of the segment. Legs: flat upper and under sides of femora largely dark-brownish, fore and back testaceous, with short silvery pubescence and scattered obliquely erect dark setae, also on front femur; base and apex of tibiae dark-brown, otherwise testaceous, tibia 1 with one dark ring in middle, tibiae 2 and 3 with series of dark patches, length of dark spines subequal to diameter of tibia; second tarsal segment yellowish, third segment brownish, ventral side of second tarsal segment of third leg with two rows of six spines. Genital structures of ♀, spermatheca piriform, with proximal flange (fig. 17d), teeth

of ovipositor blade sharply pointed (fig. 17f), apex of second gonapophysis tapering (fig. 17f above.)

Material. — Holotype (♀), China Balang, Wassu-land, W. Szechwan, Sankiangkow, 7.viii.1934, leg. Friedrich (in Leningrad Museum).

Comparative notes on *Calacanthia*.

The genus *Calacanthia* is characterized by the flattened first and second antennal segment in the male (fig. 16d, e). Only three species have been assigned to this genus, viz., *C. trybomi* (Sahlb., 1878) and *C. alpicola* (Sahlb., 1880) from the northern arctic regions (habitat descriptions in Lindsog, 1975), and *C. tibetana* Drake, 1954, from Tibet. My re-examination of the species originally described as *Acanthia angulosa* Kiritshenko, 1912, and listed under *Telolenca* by Reuter (1912) as well as Drake & Hoberlandt (1951) in their catalogue, has shown that it represents a true *Calacanthia* (a reference to this unpublished conclusion was made by Lindsog, 1975). The new species *C. grandis* from China shares with *C. tibetana* and *C. angulosa* the protruded anterolateral edges of the pronotum (fig. 16g). This character and the sharply notched ovipositor blades (fig. 17f) separate this Himalayan group of species from the arctic pair of species (compare with figs. 16f and 17e). *C. grandis* sp. n may be on the average significantly larger than the other species; the single specimen at hand measures 7.5 mm. The largest size of the type series of *C. angulosa* is 6.0 mm (♀ submacropt.), whereas the type series of *C. tibetana*, including macropters, varies from 4.25–5 mm. *C. grandis* has proportionally much longer antennae; the ratio length antennal segments 2–4/width pronotal collar is 3.84 (2.3–2.9 in *C. angulosa*, $n = 5$; 2.3–2.5 in *C. tibetana*, $n = 3$). The second antennal segment is also more slender than in the other two species; its apex is about 0.7 the widest diameter of segment 1 (subequal in the other species). It remains, therefore, questionable whether the typical antennal character of *Calacanthia*, which is demonstrated so clearly in the male sex, applies also for *C. grandis*, males of which are not yet known. Other differences between *C. grandis* on the one hand, and *C. tibetana* and *C. angulosa* on the other are: dark pattern of extremities and forewings predominating in *C. grandis* and less in the other species (fig. 15d and fig. 15 e–i, respectively); erect dark setae scattered all over the head in the former, only two erect setae

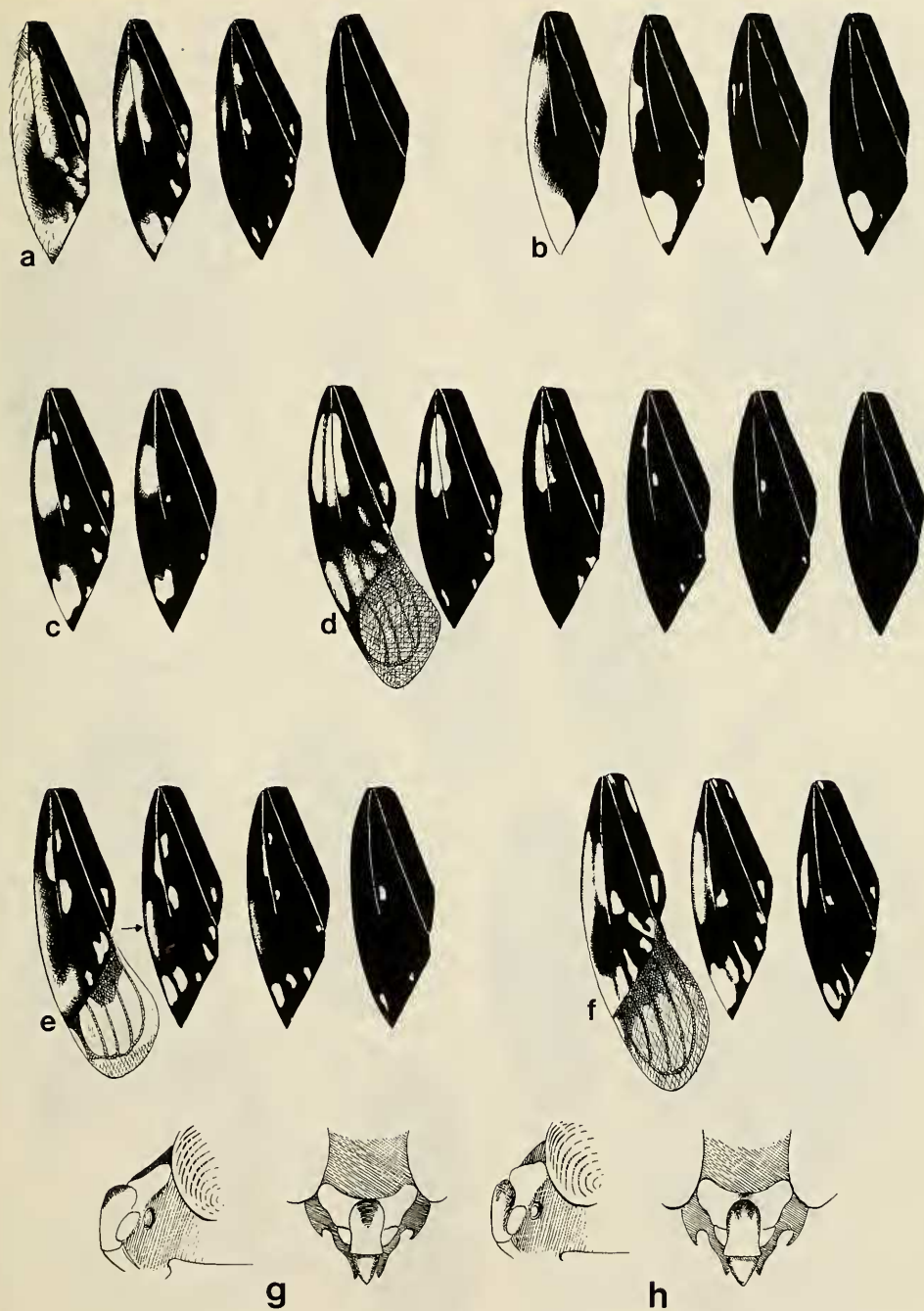


Fig. 14. Pigment variation of wings of *Macrosaldula* species. a, *M. scotica*; b, *M. madonica*; c, *M. tadzhika*; d, *M. jakovleffi*; e, *M. nivalis*; f, *M. miyamotoi*. g, h, lateral and frontal side of male head; g, *M. nivalis*; h, *M. jakovleffi*.

on vertex in the latter two species. *C. tibetana* and *C. angulosa*, both from Tibet, reveal a close phenetic relationship, and I considered the possibility of conspecificity. However, some discrepancies may speak well for a specific status of both, awaiting more material from other localities. *C. tibetana* has a more sharply defined wing pattern (fig. 15i), indeed resembling *Teloleuca* species (e.g. fig. 15b) with the exception of *T. kusnezowi*. The spots on the wings of *C. angulosa* are less prominent and ash-black areas on corium and clavus prevail (fig. 15e—h). In the latter species, the basis of the exocorium is clearly wider than the adjacent part of the endocorium, whereas these parts in *C. tibetana* are at most subequal. The reduction of the forewing in not fully winged specimens is more marked in *C. angulosa* (weakly semibrachypterous, in terminology by Cobben, 1960) than in *C. tibetana* (submacropterous). A pronounced difference in reduction of flight ability can be deduced from the development of the hind wing. Its length is subequal to the fore wings in *C. tibetana*, but in *C. angulosa* the hindwings are only stubs, not surpassing the level of the scutellum apex. Such variations in wing development are apparently not related to differences in altitude. The type series of *C. angulosa* was collected at an elevation of 4300—4700 metres (I saw an additional ♀ from E Tibet, 4000 m, Shopando, Kham, 4.v.1936). The type material of *C. tibetana* originates from 5000 m altitude. Two other characters may be of value to separate both species, premised that additional material will confirm constancy. In *C. tibetana*, and not in *C. angulosa* and *C. grandis*, I found the ♀ ventral wing margin posteriorly of the hypocoastal lamina provided with weak transverse ridges (fig. 15c). The spermatheca of *C. angulosa* is more than three times as long as wide at its base (fig. 17b), whereas in *C. tibetana* it is spherical (fig. 17c). Although there is considerable intraspecific variation in the shape of the spermathecal bulb in *Saldula* species (Karnecká, 1974), the noted differences in *Calacanthia* being exactly the same in two specimens of each species checked, might prove to be of significance. The same counts possibly for the parameres (fig. 16b, *C. tibetana*; fig. 16c, *C. angulosa*) which could be studied in only one individual of each species.

Teloleuca kusnezowi Lindberg, 1934

Additional data. — The eunomic variation of the wing pattern of *T. kusnezowi* Lindberg, 1934, and other details of this species are pre-

sented in fig. 20, since after the original description based on one female from Khabarovsk no further records were published. Abundant new material reveals that the species is distributed in USSR as is shown on map 4, but also occurs in Japan. The localities in Japan and USSR, from which I have seen material, are as follows.

Japan (Hokkaido) Berabonai, near Ashoro, 2 ♂ 1 ♀, 8.vii.1958, leg. S. Miyamoto (together with *S. nobilis*); Aizankei, 5 ♂ 5 ♀, 1 larva, 9.viii.1967, leg. A. Nakanishi; Tennin-kyo, 1 ♂ 1 ♀, 1 larva, 27.vi.1967, leg. T. Saigusa; Yukomanbetsu near Mt. Daisetsu, 5 ♂ 5 ♀, 2.vii.1970, leg. H. Hasegawa. (Honshu) Mt. Yagadake, 4 ♂ 3 ♀, 18.vii.1939, leg. H. Hasegawa; Masutomi Kai, 3 ♂, 26—29.vii.1957, leg. S. Miyamoto. The Leningrad Museum contains series from the following localities: Amur region: Korsakovo, river Amur W of Svobodnyy, 3 ♂ 3 ♀, 24.vii.1959, leg. Kerzhner; Birshtera, river Zeya, 50 km of Blagovestshensk, 1 ♀, 19—26.vi.1914, leg. Popov. Khabarovskiy Kray: Imperatorskaya Gavan' (now Sovetskaya Gavan'), 1 ♀, 26.vii.1916, leg. Krylov, from Kiritshenko's collection; Ozerpakh, delta of river Amur, 1 ♀, 18.vii.1915, leg. Tshernavin. Primorskiy Kray: confluence of rivers Iman (now Bol'shaya Ussurka) and Tatyube (now Dal'nyaya), 1 ♀, 24.vii.1913 (Buyanova); Vinogradovka, 27 ♂ 10 ♀, 5—6.viii.1929, leg. Kiritshenko; river Suputinka (now Komarovka), 1 ♀, 26. vii.1935, leg. Samoylov; ibidem, 2.iv, 8.vii.1937 and 1 ♂, 22.vii.1937, leg. Richter; ibidem, 1 ♂ 3 ♀, 12—22.vii.1940, leg. Ivanov; ibidem, stony bed of the stream Egorskiy Klyutsh, 1 ♀, 30.vii.1953, leg. Kurentsov; Vladivostok, 1 ♂, 27.ix.1932, leg. Rysakov; ibidem, Shamora (now Lazurnaya) bay, 12 ♀, leg. Stepanov & Shutova; river Sudzuke (now Kievka), 3 ♂, 12—15.viii.1948, leg. Sharov; river Peyshula (now Suvorovka), 1 ♀, 12.vii.1963, leg. Nartshuk; Frolovka, Sutshan (now Partizansk) district, 1 ♂, 3.vii.1926 and 2 ♀, 7.vii.1926, leg. Rostovyykh; Tigrovaya, same district, 3 ♂ 5 ♀, 26.vi—3.vii.1928, leg. Rostovyykh; Fanza (now Rutsh'i), same district 1 ♂, 15.vii.1926, leg. Rostovyykh; Derzhanovo, same district, 1 ♂ 1 ♀, 12.vii.1928, leg. Rostovyykh; Sedanka, Vladivostok, 1 ♀, 20.vi.1927, leg. Sokolov.

Salda kiritshenkoi sp. n. (figs. 18a left, b, c, 21d)

Description. — For measurements, see table 1. Large (5.2—6.8 mm) semibrachypterous, up to 7.8 mm macropterous), rather dull, coal-black species with fine cover of very short, densely packed brown setae. East-USSR, Japan, NE China.

Since the resemblance with *Salda muelleri* (Gmel.) is very strong, only the differences will be mentioned.

Male genital structures (fig. 15b, c) are of the

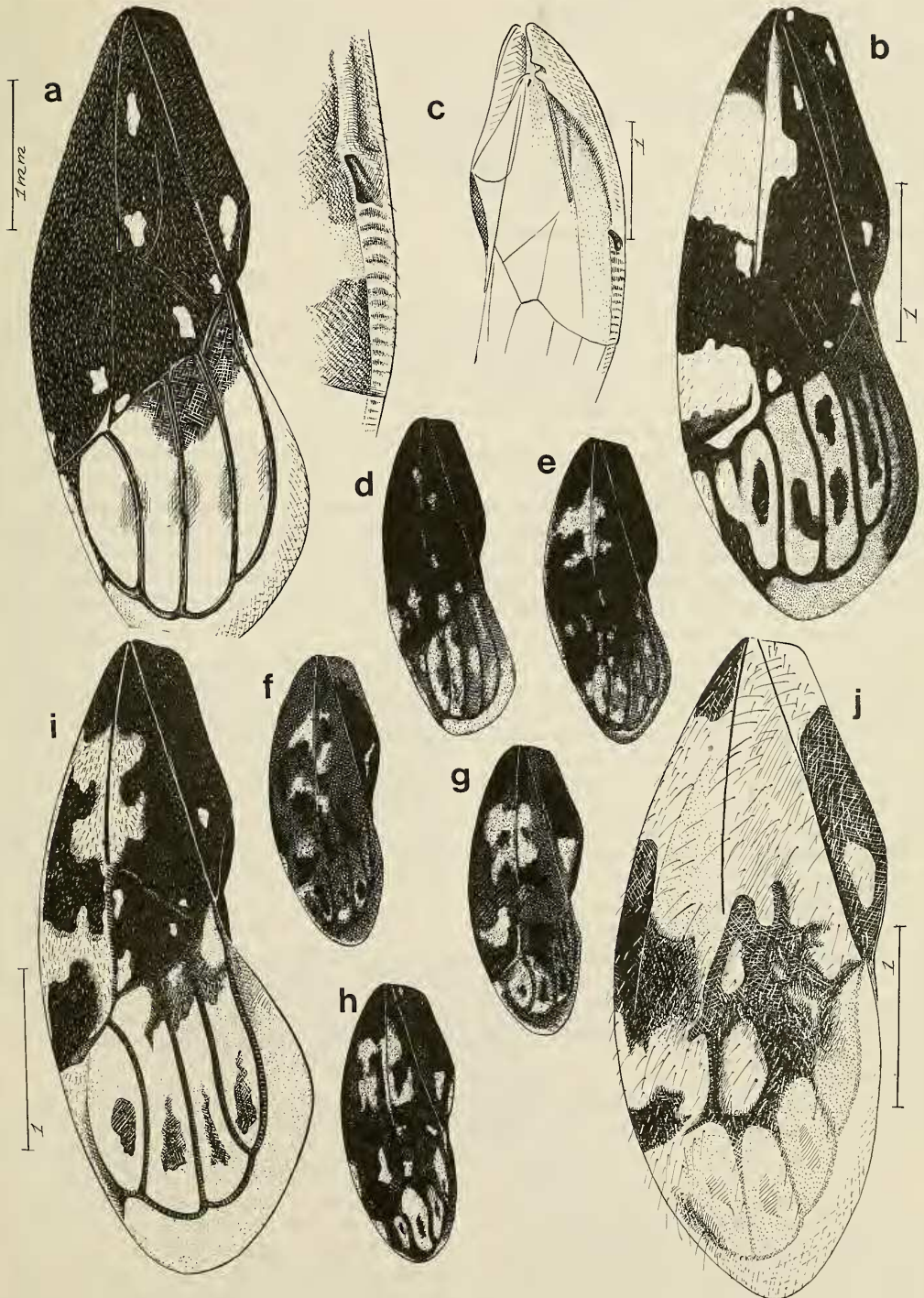


Fig. 15. Left forewing. a, *Macrosaldula nivalis*; b, *Teloleuca brancziki*; c—j, *Calacanthia* species; c, i, *Calacanthia tibetana*, c, underside of semibrachypterous specimen, with hyposcostal lamina and coupling pit (enlarged in left figure), i, macropterous specimen; d, *C. grandis*, holotype ♀; e—h, *C. angulosa* (cross-hatching on corium and clavus indicates ashy-black colour); j, *C. trybomi*.

	<i>kiritschenkoi</i>	<i>muelleri</i>
ratio length/width (semibrachypterous)	1.7—2.0	2.0—2.2
lateral wing margin	strongly convex (fig. 15a left)	less arched (fig. 15a right)
short brown hairs on upper side of thorax and wing	dense (fig. 18d), giving the species a more dull appearance	very sparse (fig 18b)
corium	without punctations	punctated
corial veins	hardly visible	distinct
colour	maxillary plates black, anteclypeus with narrow, light basis, only midpart of labrum lightish, first antennal segment and tibiae tending to blackish	mentioned parts in general more extensively ochreous lightish
head	with only few short hairs	somewhat more hirsute

same shape in both species. The most distinctive constant difference is the layer of short setae on the wing, which is much more dense and very regularly spaced and orientated in the new species (fig. 18d). I could not find any morphometric difference, except for the on the average broader shape of short-winged *S. kiritschenkoi*. All specimens lack any light spot on the corium, whereas in *S. muelleri* the mesocorium sometimes has one white spot. *S. morio* Zett., also a related species, has usually several endocorial spots, and is otherwise recognizable by the more or less shiny, not punctated cuticle. The only North American *Salda* species with which *S. kiritschenkoi* could be confused is *S. buenoi* (Mc Dunn). However, *S. buenoi* has part of the lateral wing margin almost straight, a more dense and longer golden pubescence, corium with light spots and longer distal processes of the median endosomal sclerite; such a prolonged sclerite is an apomorphic character of all other N. American *Salda* species, except for the Holarctic *S. littoralis* (L.).

Length of macropterous holotype ♂ 6.0 mm, width 2.8 mm. Length of paratypes varying from 5.2 mm (semibrachypt. ♂) to 7.8 mm (macropt. ♀).

Material. — Holotype (♂) (macropterous), USSR, Primorskiy Kray: valley of the river Odarka, about 25 km from Station Evgenévka (city Spassk-Dal'niy), 16.vi (old style calendar, = 29.vi), 1911, leg. A. Tsherskiy (in Zool. Mus., Leningrad). Paratypes, USSR, Primorskiy Kray, 1 ♀ semibrach., 2 ♀ macropt., idem 4. (= 17).vii.1911; Sivakovka, south shore of lake Khanka, 2 ♀ semibrach., 23.vi.1924, leg.

Samoylova; lake Khanka, Kamen'-Rybolov, 1 ♂, 30.vi.1910, leg. Tarobarov; Tshernigovka, 1 ♀ semibrach., 5.vii. (= 18.vii).1912, leg. Emelyanov; Ryazanovka, Khasan district, 3 ♂ 1 ♀ semibrach., 9.vii.1982, leg. I. Kerzhner; Vladivostok, Station Okeanskaya, 1 ♀ macropt., 10 (= 23).vii.1911, leg. Stshavinskaya, from the coll. of Kiritshenko. Khabarovskiy Kray: Krasnaja retshka, pr. Khabarovsk, 3 ♀ semibrach., 2 ♀ macropt., 2 ♂ semibrach., 10.vii.1931, leg. Pereleshina; Knyaze Volkonskoye, nr. Khabarovsk, 8 ♂ semibrach., 4 ♂ macr., 5 ♀ semibrach., 7.vii.1977, leg. Štys & Davidová (dry salt-steppe); Khabarovsk-Ussuri, 1 ♂ macropt., 1.vii.1978, leg. Štys & Vilimová; Khabarovsk south, 1 ♀, 4.vii.1977, leg. Šys & Davidová. Kunashir Island: Golovnin volcano, 2 ♀ semibrach., 10.vii.1980, leg. A. Gorokhov; Sernovodsk, Glukhoe lake, 1 ♂ 1 ♀ semibrach., 28.viii.1980, leg. Egorov & Kanyukova. NE China: railway stations Shanshi and Hailing between Harbin and Mudankiang, 1 ♀ semibrach., 7.vii.1902, leg. Krylov. Japan: Akkeshi, Hokkaido, 4 ♀ semibrach., 5. vii. 1958, leg. T. Nakane. Paratypes in Zool. Mus Leningrad, Jap. Nat. Museum and in coll. Wageningen, Hasegawa (Japan), Lattin (Oregon), Polhemus (Colorado), Popov (Moscow) and Štys (Czechoslovakia).

I have further seen a specimen (1 ♀ semibrach.) labelled: Proskurov (Khmel'nitskiy), vii.1895, leg. Zubovskiy; this locality is in the Ukraine, far away from the territories near the Sea of Japan. Future collections may prove whether the Ukraine indeed lies within the range of the species, or that the specimen in question has been mislabelled. A recent collection received from Dr Štys confirms that *S. kiritschenkoi* occurs much further to the West than expected. The new material is from Kirgi-

zia, Ala-Archa, 2000 m, near Frunze, 2 ♂ 2 ♀, 21.vi.1982, leg. Štys (very humid habitat along stream, on open places in between thick vegetation of moss and sedges). The only difference with the Far-East specimens is the fact that the central-Asian material has somewhat more pronounced elytral veins, lighter coloured hind tibiae and graphite-black membrane.

For comparative notes, see next chapter.

DISCUSSION OF EURASIAN *SALDA* SPECIES

The records of *S. kiritshenkoi* (map 3) suggest a broad-band distribution in Asia between 43° and 61° latitude. The labels do not always include data on altitudes, but the occurrence around the lake Khanka and the mentioned locality on Hokkaido suggest it to be a lowland species, although the Kirgizian population was found at 2000 m altitude. The closest relative, *S. muelleri*, also lives predominantly at low and submontaneous altitudes. The distribution-map of this species so far shows only few scattered localities in the USSR (map 3), but it has a very vast, probably continuous distribution from West-Europe on to the Sea of Japan. I saw 1 ♀

from Khabarovsk collected together with a series of *S. kiritshenkoi* (leg. Štys & Davidová, 7.vii.1977).

Other species which could be confused with both *S. kiritshenkoi* and *S. muelleri* at superficial inspection are *S. morio* (Zett.), *S. micans* Jak. and *S. splendens* (Jak.). Since I could study the type material of the latter two poorly known species, further data on them are presented here.

The main differences of semibrachypterous specimens can be tabulated as follows.

When *S. kiritshenkoi* is added to the left of this table, we have a series of species with decreasing pubescence and increasing polished cuticle from left to right. *S. morio*, *micans* and *splendens* show a weak metallic lustre of the dorsal surface. *S. splendens* is easily recognised by erect semilong dark setae on thorax and hemielytra (fig. 16d). Identification of single individuals of *S. muelleri*, *morio* and *micans* may be difficult and the combination of tabulated characters may help the decision. There is a great overlap in body size and width but the mean value (underlined) of *S. muelleri* (20 ♂, length in mm 4.73—5.21—5.80, width 2.21—

	<i>muelleri</i>	<i>morio</i>	<i>micans</i>	<i>splendens</i>
hemielytra: texture	punctate, weakly shining	impunctate, more or less distinctly shiny, except for exocorium and membrane	polished, strongly shining	polished, strongly shining
hemielytra: setosity	with sparse, short setae (fig. 18b)	very scattered short setae (fig. 18a)	as <i>S. morio</i>	erect semilong dark setae in addition to sparse short setae (fig. 16d)
hemielytra: pigmentation	corium rarely with one midapical light spot; membrane of macropter for major part dark (fig. 16k)	corium often with some light spots; inner margin of membrane usually lightish, membrane of macropter for major part lightish (fig. 16j)	entirely black	entirely black
first coxa	black, apex sometimes lightish	black, apex often lightish	entirely pale	entirely pale
pigmentation of femora	fig. 16a	fig. 16b	fig. 16c	fig. 16c
pigmentation of first and second antennal segment	fig. 16e	fig. 16f	fig. 16g	fig. 16g

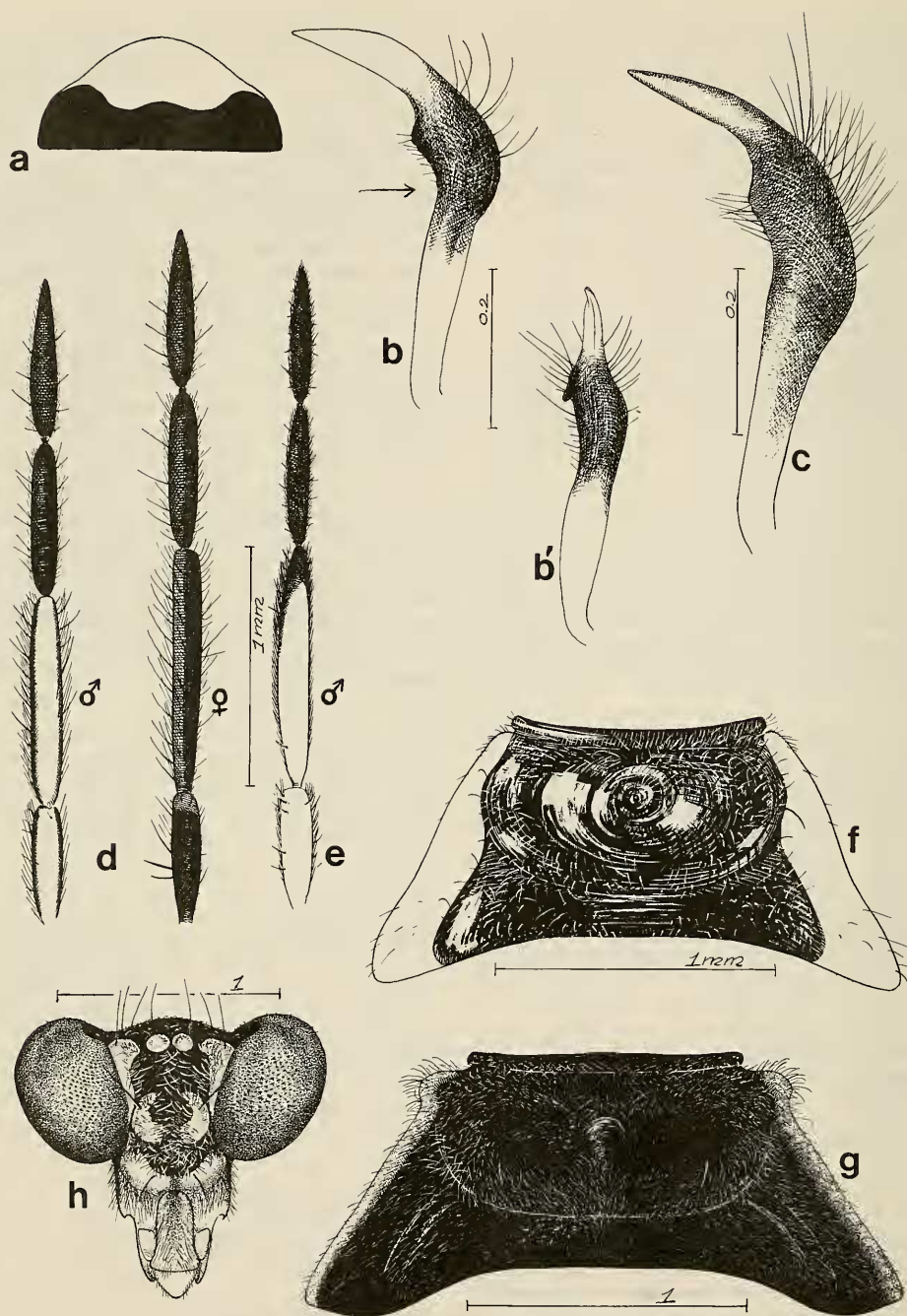


Fig. 16. *Calacanthia* species. a, f, h, *C. trybomi*; b, *C. tibetana*; c, e, g, *C. angulosa*; d, *C. alpicola*. a, subgenital plate ♀; b, c, left paramere, b, innerside, seen in direction of arrow in b; d, e, right antennae; f, g, pronotum; h, head, frontal aspect.

2.39—2.79; 17 ♀, length 5.30—5.98—6.55, width 2.73—2.98—3.20) is smaller than the respective dimensions of *S. morio* (18 ♂ 5.0—5.84—6.30, 2.53—2.63—2.80; 20 ♀, 6.08—6.54—6.96, 3.00—3.19—3.55). The material of *S. micans* and *S. splendens* is too limited to allow reliable comparison, but these species tend to fall into the size class of *S. muelleri* (*S. micans*, 3 ♂ length 4.5—4.9, width 1.8—2.1, 2 ♀ length 5.2—6.1, width 2.36—3.0. *S. splendens*, 3 ♂ length 4.4—4.8, width, 1.7—2.0, 2 ♀ length 5.7—6.5, width 2.6—3.1).

I could not find reliable differences, neither in the genitalia (the median penis sclerite seems to be more slender in *S. micans* and *splendens* (fig. 15j)), but this should be checked in more specimens), nor in the many ratios calculated from a variety of measurements. Considerable variation of ratios exist, which is partly due to allometric differences between smaller and larger individuals.

The general facies of some smaller specimens of *S. splendens* and *S. micans* looks at first sight somewhat different from the other species (pronotum with straight lateral margins, humeral edges more acute and somewhat upturned). Other specimens are more like *S. muelleri* and *S. morio*, in which the shape of the pronotum also varies. The metallic lustre mentioned in the original description of *S. micans* is not consistently present in the series seen by me, but often also occurs in *S. muelleri* (according to Wróblewski, 1966) and in *S. morio*.

Whereas *S. muelleri* and *S. morio* from West Europe can be reliably discriminated, specimens from the eastern Palaearctic are more difficult to identify, especially the long-winged forms in which the dorsal cuticular texture tends to be intermediate. In macropters of *S. morio* from the USSR (Irkutsk, leg. Jakovlev, 3 ♂ 2 ♀, together with semibrachypterous specimens) the wing is less shiny, and of *S. muelleri* (4 ♀ from different localities in USSR) less punctate than in typical specimens. However, the difference in dorsal pubescence between both species remains constant; this is also mostly true for the difference in pigmentation of the membrane (fig. 16j, k). Since I had no opportunity to reidentify material of all published records from eastern regions, the distribution patterns of *S. morio* and *S. muelleri* remain somewhat uncertain (possible misidentifications). The identity of some specimens (see below) remains dubious until more material will be available for

study. The available information is summarized below under the individual species.

Salda muelleri (Gmelin)

This species occurs further south in Great Britain (Scudder, 1958) and all over the continent than the next species (*S. morio*). In the mediterranean subregion it has been recorded incidentally from France (Puton, 1880). Greece (Reuter, 1895) and Turkey (Lindberg 1922). In Poland it is known from some 20 localities (Wróblewski, 1966) and in Czechoslovakia it seems to occur in northern localities of the Carpathian Basin (Benedek, 1970) and in Bohemia (Štys, unpublished). Both this and the next species have not yet been collected in Albania, Yugoslavia, Bulgaria and Roumania (Josifov, 1970). To the east, the exact distribution pattern is poorly known. Its occurrence is broadly indicated by Kiritshenko (1951) as: "Forest zone of the European part of the USSR up to Volyn', Khar'kov and Ryazan' provinces". Vinokurov (1979a) listed it for East Siberia, and Kerzhner (1978) as a questionable record for Kunashir Island which, however, appears to belong to *S. kiritshenkoi*. I have seen the following material, mostly from the Leningrad museum (semibrach. if not otherwise stated):

Leningrad region: Ol'gino, 3 ♂ 9 ♀, 6 larvae, 20.vi.1901, 17.vi—9.viii.1902, leg. Bianchi; Krupeli, 1 ♀, 30.vi.1897, leg. Mazarakiy; Terioki (now Zelenogorsk), 2 ♀, 1889, leg. Wagner; Shuvalovo, 1 ♂, 25.v.1897, leg. Zubovskiy; Chernaya Lakhta, 1 ♀, 1.vii.1904, leg. Bianchi; Log near Luga, 1 ♂, 1 larva, 18.vi—1.vii.1918, leg. Jacobson; Sablino, 1 ♂ 1 ♀, 21.vi.1921, 6.vii.1922, leg. Bianchi; Ostrovki, river Neva near Schüsselburg (now Petrokrepost'), 2 ♂ 1 ♀ macr., 5—6.vi. 1906 (leg. Jacobson); Lobanovo, 1 ♀, 14.vi.1906; Lakhta (now part of Leningrad), 1 ♀, 22.vi.1919, leg. Reichardt; Pomeranye, 2 ♂ 4 ♀, 10.vii.1911, leg. Ihgin; river Tigoda, 4 ♂ 1 ♀, 4.vi.1911, leg. Semenov - Tjan - Shanskij (series of this locality somewhat less punctate); Svir, 1 ♀, (?), leg. Günther; Lisiy Nos (now part of Leningrad), 1 ♀ macr., 20.vi.1889, leg. Silantyev.; Zelenogradskaya railway Station, near Moscow, 1 ♀, (?), leg. Y. Zhezekhin (in coll. Popov). Karelian SSR: Petrosavodsk, 1 ♂ 1 ♀, (?), leg. Günther; Muromli, 1 ♂ 1 ♀ (?), leg. Günther; Vitebsk region: Vitebsk, 1 ♀, (?), leg. Birula. Arkhangelsk region: Shipitsino, 3 ♂ 3 ♀, 1 ♀ macr., 1 larva, 20.vi and 6.vii.1942, leg. Stark (note of Dr Kerzhner: "at my experience this label is wrong and refers to insects collected in more southern regions"). Pskov region: Kharlamova gora near Gdov, 1 ♂ 1 ♀, 15.vi.1898 (leg. Bichner). Kalinin region: Bologoe, 2 ♀, 1 larva, 5.vii.1903, 10.vi.1904, 11.viii.1904. Estonian SSR: Gapsal (now Haapsalu), 1

♀, (?), leg. Morawitz; Sillamyagi (now Sillamyae), 1 ♀, 25.vi.1930, leg. Bianchi; Merrikul, 1 ♂, 7—10.vii.1904, leg. Somira. Volgograd region: Sarepta (now part of Volgograd), 2 ♂, (?), leg. Becker, Ryazan region: Kazachiy near Rannenburg, 1 ♀, 24.vi.1903, leg. Semenov. Ukraine: Rovno region: Krasnoe, near Dubno, 1 ♂ 1 ♀, (?), leg. Karavaev; Chernyakov near Ostrog, 1 ♀, 1—5.vii.1900, leg. Neklyudov. Volyn' region: Zamostochye near Senki, 1 ♀, 14.vi.1905, leg. Birula. Khmel'niitskiy region: Kamenets-Podolskiy, 1 ♀, (?), leg. Birula. Donetsk region: Yarovaya near Svyatogorsk (now Sosnovo), 1 ♂, 19.vi.1938, leg. Arnoldi. Kazakhstan: Aktyubinsk region: Berchogur, Mugodzhazy Mts., 1 ♀, 8.vii.1932, leg. Lukjanovitsh. Turgay region: Kokshtau Mts., 1 ♀, 23.vi.1957, leg. Asanova. Siberia: Irkutsk region: river Belaya, tributary of Angara, 2 ♂ 1 ♀, leg. Gartung. Maritime Province Far East, Primorskiy Province, Knyaze Volkonskoye near Khabarovsk, 1 ♀ macr. (together with *S. kiritschenkoi*), 7.vii.1977, leg. Štys & Davidová.

Salda morio (Zetterstedt, 1840)

As far as it can be concluded from the available reliable records this species has a more distinct northern Eurosibirian distribution than the foregoing species. Its range extends eastward into N. Mongolia (Josifov & Kerzhner, 1967, Hoberlandt, 1971a, Vinokurov, 1979b), Kuril Isl. (Kerzhner, 1978) and Japan. I have verified Russian material from the following localities:

Karelia, Muromli, 2 ♀, leg. Günther; idem, Ladoga, 1 ♀, leg. J. Sahlberg; Ukraine, Krasnoe, Volyn' region (now in Rovno province), 1 ♀, leg. V. Karavaev (together with *S. muelleri*); environment of Irkutsk, Pashkovskoe, river Angara, 1 ♂, and Markovo, 2 ♂ 1 ♀, leg. Jakovlev; Mongolia East aimak, river Nömrögin-Gol, 32 km SE of Mt. Salkhit, 1 ♂ 1 ♀, 8.viii.1976, leg. I. Kerzhner; East aimak, Mt. Derkin-Tsagan-Obo, 60 km ENE of Bayan-Burd, 1 ♂ 1 ♀, 3.viii.1976, leg. I. Kerzhner; Transbaicalia, river Ingoda, 1 ♀, 11.vii.1989, leg. G. L. Suvorov (type locality of *S. splendens*); Amur region, Samodon near Korsakovo, 1 ♀, 7.viii.1959, leg. I. Kerzhner; Klimoutsy 40 km W of Svobodny, 1 ♂ 1 ♀, 15.vii.1959, leg. I. Kerzhner; Primorskiy Kray, Ryazanovka, Khasan district, 3 ♂ 1 ♀, 9.vii.1982, leg. I. Kerzhner; Saghalien, Shiritori (now Makarov), 1 ♂ 2 ♀, 3.viii.1938, leg. H. Hasegawa.

The only published record of *S. morio* in Japan is the Oze district, Honshu (Asahina & Hasegawa, 1951, and Hasegawa, 1954). I have seen long series from this region and can conclude only provisionally that this belongs to *S. morio*, despite of some minor differences with European specimens (corium between veins less shining). I further studied 2 ♂ and 1 ♀ from

Hokkaido, Mt. Daisetsu, 8.viii.1967, leg. A. Nakanishi.

Dr Lindskog (Stockholm) kindly sent me for judgment 1 ♂ and 1 ♀ collected by Poppius near Ytyk-haja, Lena River (in Zool. Mus., Helsinki), identified as *S. morio* by H. Lindberg. As Lindskog already noticed both specimens have a very polished dorsal surface, the outer margin of the exocorium being dull. The highly shining wings, without erect setae, are reminiscent of *S. micans*, but in contrast to this species, the corium bears lightish spots and the membrane is largely unpigmented. Both rather large specimens (♂ 5.9 mm, ♀ 6.5 mm) are somewhat teneral. Provisionally, I must conclude that they belong to *S. morio*, awaiting larger samples from that region.

Salda micans Jakovlev, 1889

Five specimens are located in the Leningrad Museum, one of which (♀) from the type locality: Kultuk (leg. B. Jakovlev). I designated this specimen as the lectotype with an appropriate red label. The data of the other specimens seen by me are as following:

Tuva (Tuvian autonomous province): Shagonar forestry, river Ulug-khem (= Yenisey), locality Adar-khysh, 2 ♂ 1 ♀, 2.vii.1956 (leg. Levin); Yakutian (Yakutian ASSR), Badarannakh, ca. 100 km W of Yakutsk, 1 ♂, 17.viii.1926, leg. Ivanov. These localities are plotted on map 3.

Salda splendens (Jakovlev, 1905)

Five specimens from the type locality are located in the Leningrad Museum (Transbaikalia, river Ingoda, 2 ♂ 3 ♀, 11.vii.1898, leg. G. L. Suvorov; 1 ♀ has no locality label, but the same collector label). I designated one of the males as the lectotype with an appropriate red label. The following new additions can be mentioned:

Tunskinskiy Gol'tsy Mts, E. Sayan mountain region in Buryatian ASSR, E. Siberia, 1 ♀, no other data; erect hairs somewhat rubbed off (in Coll Mus. Nat. Hung.). Badarannakh, ca. 100 km W of Yakutsk, 16.viii.1926, leg. Ivanov (pin with only rostrum and one forewing); this locality is the same as one given for *S. micans*, but collected one day earlier; N. Korea, Daitaku, Kankyo-hokudô, 2 ♂, 8.viii.1939, leg. M. Tanaka (1 ♂ in Ent. Lab. Kyushu Univ. Japan, 1 ♂ in coll. Wageningen). Localities are plotted on map 3.

Salda littoralis (Linnaeus, 1758)

Also on the status of subspecies *piechockii* Wagner, 1967, and of *S. nevadensis* Wagner, 1960.

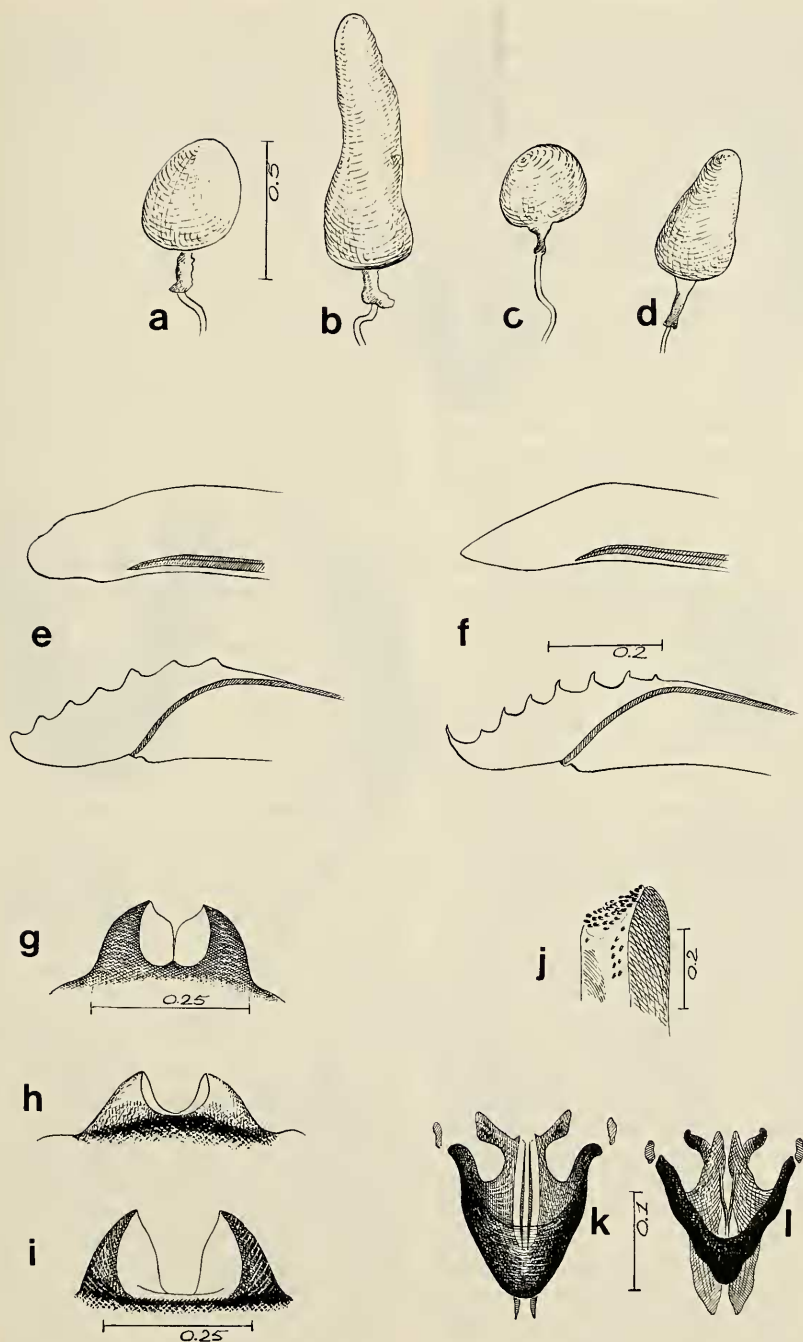


Fig. 17. *Calacanthia* species. a, e, i, *C. trybomi*; b, f, g, *C. angulosa*; c, f, g, j, k, *C. tibetana*; d, f, *C. grandis*; h, l, *C. alpicola*. a—d, spermatheca; e, f, right view of ovipositor gonapophyses; g—i, parandria; j, right grasping plate of ♂; k, l, median endosomal sclerite.

S. littoralis is the most wide-spread representative of the genus in the whole of Europe and Palaearctic Asia. The material which I have seen from Japan (first recorded for this country in 1968, Hiura), Alaska, Canada, N USA (16 specimens from eight localities), indeed conforms entirely in external and internal structures with specimens from Europe. From the abundant material present in the Leningrad Museum and Popov's collection (Moscow), partly plotted on map 3, we may conclude that the species occurs everywhere in the USSR where suitable habitats occur (marine and inland salt-marshes, exposed fresh-water swamps in mountainous areas). The next to no data from W. Siberia may be due to paucity of collections made in that region (Kerzhner, correspondence). The remarkable ecological duality of *S. littoralis* is most prominent in W. Europe where the species is restricted to salines along the Atlantic coast and to mountains from 1800 up to 2300 metres altitude (the Alps, Heiss, 1972; the Pyrenees, pers. observ.). It is remarkable that *S. littoralis* seems to be absent in the Carpathian mountains (Benedek, 1970, Hoberlandt, 1977, Štys, pers. comm.). On the other hand, this mountain chain everywhere harbours the endemic saldid *Teloleuca brancziki*, which lives on flat finely graveled banks of larger streams. *S. littoralis* does not inhabit such localities, so that its absence in the Carpathians can not be simply explained through displacement by *T. brancziki*.

The most southern inland-population in W. Europe, the Sierra Nevada, Spain, was described as a valid species: *Salda nevadensis* Wagner, 1960. However, I could not confirm the stated differences between this species and *S. littoralis*. The latter species should have larger eyes, the vertex being only 0.85—0.90 (♂) and 0.95—1.02 (♀) times as wide as one eye. The head and especially the gula should be longer, the labrum larger and more porrect, the pronotum and forewings wider than in *S. nevadensis*. My measurements, based on eight male and 14 female paratypes of *S. nevadensis* and on a double number of *S. littoralis* from various origins in the NW and NE Palaearctic, do not show divergence in the characters mentioned. For example: the ratio head width/width of vertex varies in *S. littoralis* between 2.41—2.54 (♂), 2.22—2.39 (♀), and in *S. nevadensis* between 2.46—2.50 (♂), 2.33—2.39 (♀). The ratio body length/width of *S. nevadensis*: 2.13—2.24 (♂), 1.97—2.15 (♀), also falls within the range of variation in *S. littoralis*: 2.07—2.23 (♂), 1.94—

2.15 (♀). The only remaining actual difference between *S. littoralis* and the single population of *S. nevadensis* is the overall smaller body-size of the latter; reduction in body dimensions is not surprising since the type locality of *S. nevadensis* is at nearly 2900 m altitude. However, this discrepancy is not so pronounced as stated by Wagner. For his new species he mentioned a length of 4.7—5.1 mm for the males and 4.9—5.4 mm for the females. He contrasted these numbers with 6.0—6.5 (♂) and 7.0—7.5 (♀) in *S. littoralis*. However, according to the literature (Cobben, 1960), the length of *S. littoralis* varies between 5.1 and 6.0 mm (♂) and 5.9—7 mm (♀) in the semibrachypterous form. The lengths of males of 6.0 up to 6.5 mentioned by me in 1960 applied to macropters, but since the nearly sixty original individuals of *S. nevadensis* are all semibrachypterous, comparisons should be made with that morph only. Finally, Wagner (1960) stressed the fact that, whereas male and female of *S. littoralis* fall in clearly different size classes, the sexes of *S. nevadensis* can only be separated by checking the genitalia. Judging from the sample I have seen, this seems somewhat overstated. The 14 females at hand vary from 5.4—5.7 mm, and the males from 4.8—5.0 mm. After all these refutations I must conclude to the synonymy of *S. nevadensis* with *S. littoralis* (syn. nov.). It is submitted that this is done purely on morphological grounds, but we may not expect that proof or disproof of reproductive isolation between the Sierra Nevada population and other populations will be supplied in the near future.

The description of *S. littoralis piechockii* Wagner, 1967, from Mongolia (1160—1750 m) suffers likewise from discrepancies with the real situation. This subspecies of about equal size as the nominate form, should have a more slender body shape, and shorter antennae and legs. The type material, which I could study (5 ♂, 3 ♀), conforms in these respects with typical *S. littoralis*. The subspecies *piechockii* should have four windings of the base of the penisfilum, and the nominate subspecies 5. I checked the 5 males on this character, but I found the basal length of the filum fit within the variability range of *S. littoralis*. In my view there is no valid criterium to uphold the subspecies taxon *piechockii*.

The coastal subpopulation of *S. littoralis* seems to have undergone at least one speciation process somewhere along the Adriatic Sea. Deviating material was originally described as a variety of *S. littoralis*, viz. *adriatica* (type locality

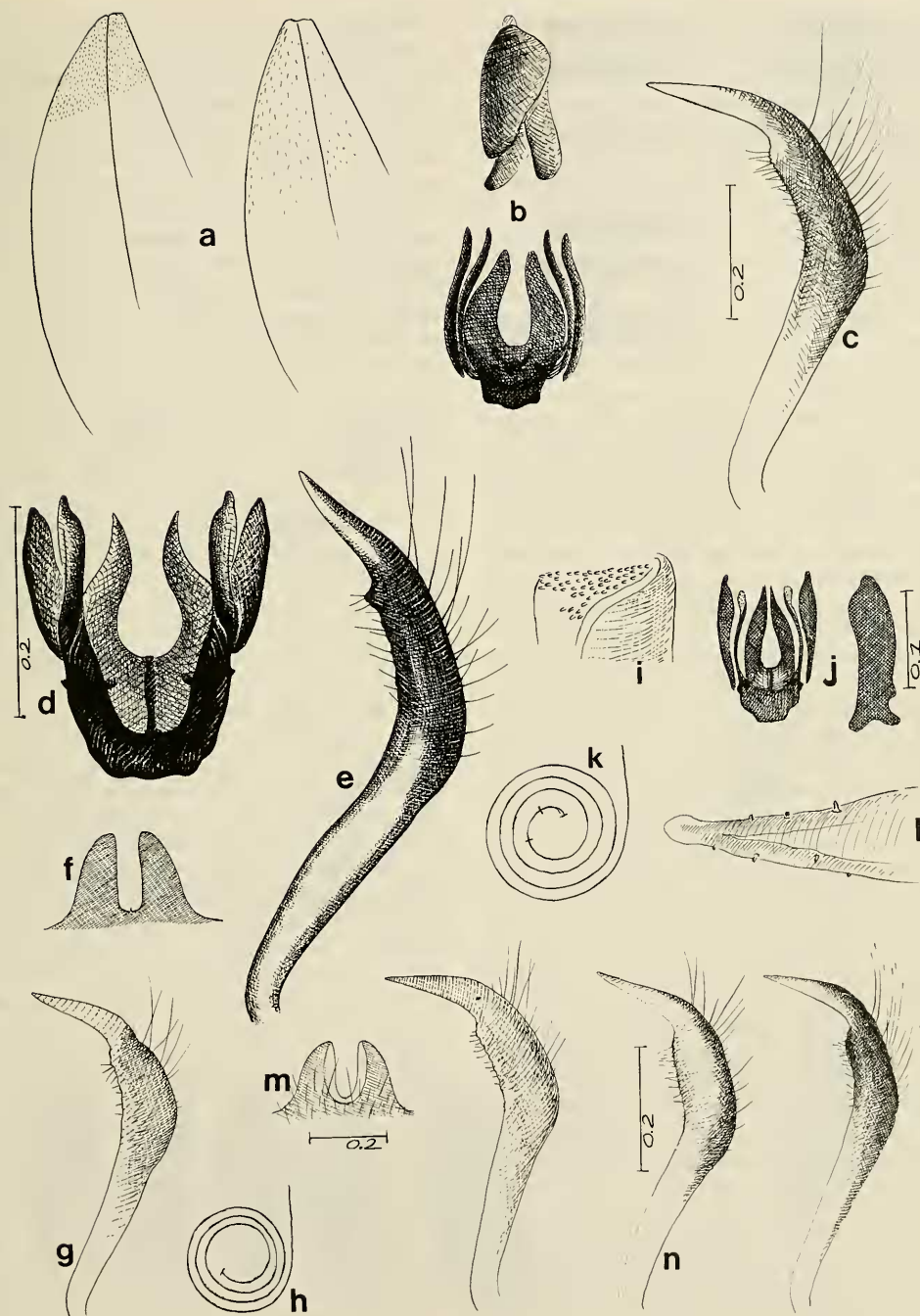


Fig. 18. *Salda* species. a, anterior part of corium of left fore wing, outline of lateral margin and vestiture of small setae; left, *S. kiritsjenkoi*; right, *S. muelleri*; b, c, *S. kiritsjenkoi*; b, median endosomal sclerite; below plane view; above, left lateral view; c, paramere; d, e, *S. morio*; d, median endosomal sclerite; e, paramere; f—h, *S. micans*; f, parandria; g, paramere; h, penisfilum; i—n, *S. splendens*; i, male grasping plate; j, median endosomal sclerite; left, plane view; right, left lateral view; k, base of penis filum, length of three individuals; l, apex of paramere; m, parandria; n, parameres; left, specimen from N. Korea; middle and right from type locality.

"Illyria") by Horváth, 1887, and subsequently (1901) recognized by himself as a valid species. Specimens studied by me at the time from the Gulf of Venezia indeed are characteristic enough to warrant specific status (Filippi, 1957; Cobben, 1960). *S. adriatica* has subsequently been reported from Greece and Bulgaria (Josifov, 1961, 1970). The population structure of this group of shore bugs in the Balkans and Asia Minor became, however, more complex after the description of *S. subcoriacea* Horváth, 1901 (type locality, Turkey, Aydin, close to the Marmara Sea). To judge from the description, this *Salda* is more or less intermediate between typical *littoralis* and *adriatica*, and therefore I treated it, in 1960, provisionally as a subspecies of *S. littoralis*. As such were also identified specimens from Turkey (Hoberlandt, 1948) and Greece (Josifov, 1970). A deliberate decision on its taxonomic status and its relation to the *S. littoralis-adriatica* complex must be postponed until long series are sampled at regular intervals along the coastal lines of the Adriatic, Aegean, Black and Caspian Seas. The seasonality should also be considered. *Subcoriacea*-like adults were collected by me in a coastal swamp in Greece (near Khalkis, 29.vii.1978). I brought them living to Wageningen, hoping that these animals from 30.5° latitude would be easier to rear than *S. littoralis* from higher latitudes and altitudes. This species is univoltine in W and N Europe and has an obligatory winter-diapause in the egg stage lasting nine months (Jordan & Wendt, 1938; Cobben, 1968). This makes it very difficult to rear large numbers in succession. My purpose was to try to hybridize the Greek population with *S. littoralis* from the Netherlands and the Pyrenees. However, it appeared that also the animals from Greece went directly into a strong egg diapause under normal laboratory conditions. Such a phenology is reminiscent of a northern origin of the ancestor of *S. littoralis*. It would be interesting to know whether the true *S. adriatica* of the Venezia lagoon still has retained this rigid life cycle.

TENTATIVE KEY TO *MACROSALDULA* SPECIES

Some historical remarks on the ranking of the taxon *Macrosaldula* as a genus were given on page 232. Most species of this group are externally recognizable by heteropterists familiar with shore bugs by their rather stout size, slender and mostly dark coloured habitus with proportionally long antennae without long erect setae on the second segment, and by their lapidi-

colous and agile behaviour, preferably along streams. The combination of these characters separate them from the smaller sized species of typical *Saldula*, a cosmopolitan genus most rich in species, and from some less typical *Saldula* subgroups, among which the *orthochila* group (page 226). The limits of both supraspecific taxa *Macrosaldula* and *Saldula* will be phylogenetically redefined elsewhere; in such a study other less obvious characters will also play a role. Some *Macrosaldula* species strikingly deviate in colour (*inornata*, *heyningeni*), or in colour and swollen antennae (*roborowskii*, see below) from the other group members. Three species deviate in some less readily visible, but important characters, such as: shape of hypocostal wing margin, position of stigmata, and shape of median endosomal sclerite. These species are *koreana*, *monae* and *rivularia*, of which the generic position may need adjustment later. It is only for practical reasons that I include all 21 species listed in the following key as belonging to *Macrosaldula*. The key includes also one species which up till now has not been associated with *Macrosaldula*-like species, viz., the species described by Jakovlev (1890) as *Salda roborowskii* from the western part of China ("Chinesian Turkestan"). It was placed in *Chartoscirta* by Reuter (1895), Oshanin (1912), Hoffmann (1933), Wu (1935) and Drake & Hoberlandt (1951), spelled as *roborowski*). Dr Kerzhner informed me that the type series from "Oases Nya and Keria" included more than one specimen judging from the indicated length (4¼—4½ mm). At the present time the type specimens could not be traced in the Leningrad Museum, but I could study another series located in that museum, apparently belonging to the same species. This material (1 ♂ 2 ♀) was collected along the river Tisnaf, 6.viii.1890, leg. Grombtschewski. The locality is about 500 km W of the type locality and is plotted on the distribution map 1. Both localities are, according to Kerzhner, along the old route passing between the southern part of the Takla-Makan desert and adjacent mountains; the altitude is about 1500—2000 m. Examination of this material reveals that it represents a member of the *Macrosaldula* clade according to the elongation of antennae and structure of the male grasping plate and genitalia. It lacks the two synapomorphies of *Chartoscirta* species (hind femur with stridulatory ridges, spherical median endosomal sclerite), but the swollen antennae (fig. 13e), somewhat elevated callus of the pro-

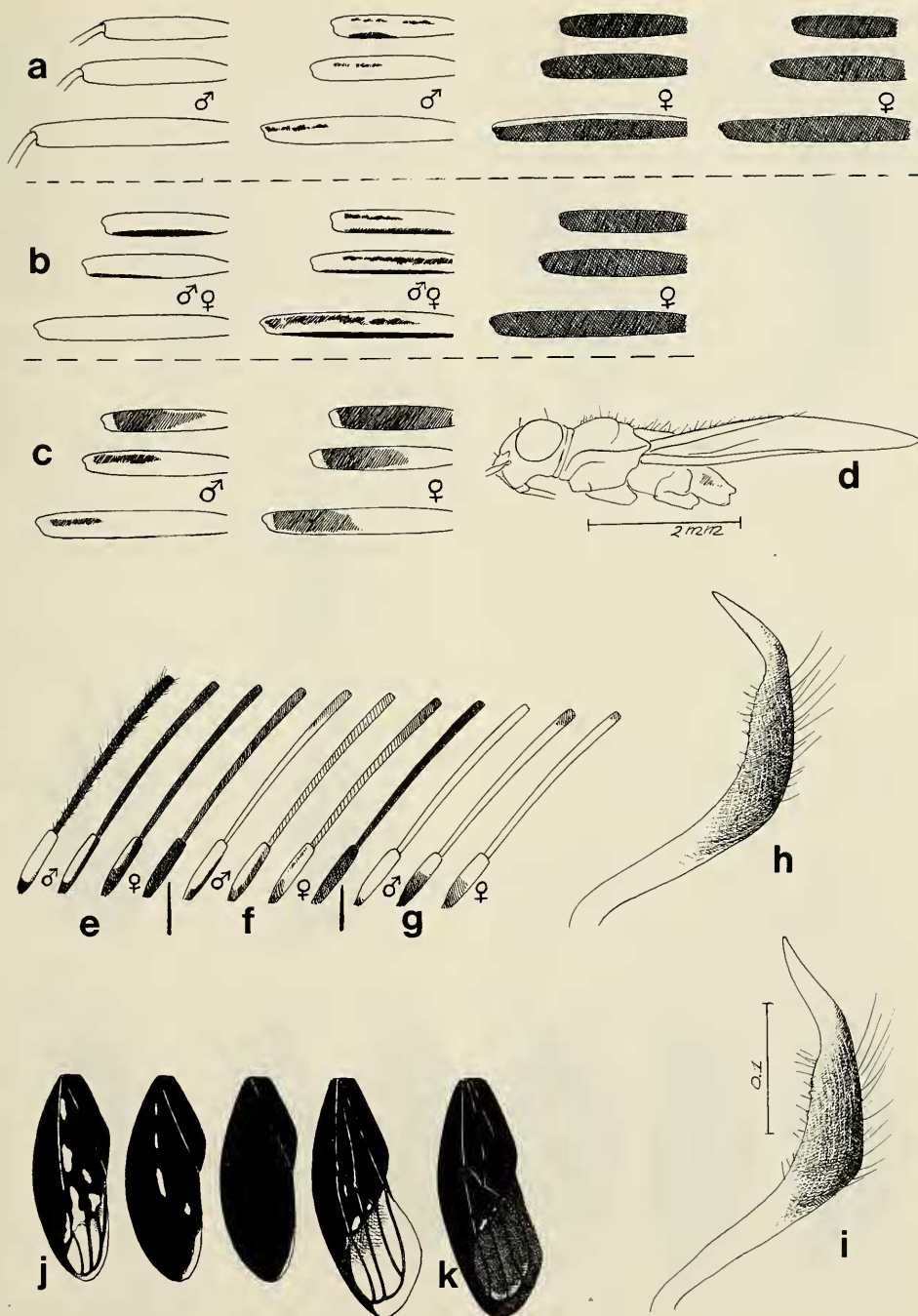


Fig. 19. *Salda* species. a—c, left side of left femora 1—3; a, *S. muelleri*; b, *S. morio*; c, *S. micans* and *S. splendens*; d, *S. splendens*, left view of holotype; e—f, antennae; e, *S. muelleri*; f, *S. morio*; g, *S. micans* and *S. splendens*; h, i, paramere of *S. micans*; j, *S. morio*, Saghalien, Japan, pigment variation of wing; k, *S. muelleri*, macropterous wing.

notum (fig. 13g), and the contrasting brown-white pattern of the corium (fig. 13c) are to some extent reminiscent of *Chartoscirta*, especially *C. dilutipennis* (Reuter), occurring in Turkestan.

I present in this paper also the illustrations of individual parameres of a number of *Macrosaldula* species. The differences exhibited should not be regarded as absolute, since the intraspecific variability has to be tested on population level. In general, paramere morphology is of only limited diagnostic value in saldids. The eunomic series of wing pattern shown in some illustrations must also be considered with some caution. I selected only those variations which reveal a smooth gradation from light to dark colour forms. Certainly, numerous small deviations from the ideal eunomy will be encountered. For some species additional material may prove that the extremes of the light and the dark morphs will exceed the illustrations provided here. Distributions are given on a large scale. For detailed country records and data on ecology see Cobben (1960), Heiss (1972), Hoberlandt (1977), Lindskog (1975), Vinikurov (1979b), and Wróblewski (1966).

1. Antennal segment 2 $1\frac{1}{2}$ times and segment 4 about 2 times as thick as segment 2 in the middle (fig. 13e). Colouration of wing castaneous brown with two transverse white fascia (fig. 13c). Pronotum with pale margin; callus somewhat swollen; (W China) ... *roborowskii* (Jakovlev, 1890) comb. nov.
- Distal segments of antennae not dilated. Colouration of wings otherwise 2
2. Wings inclusive of clavus, and legs largely straw-yellowish. Lateral pronotal sides broadly pale (fig. 8); (Iraq) ... *inornata* sp.n.
- Dark pigment prevailing 3
3. Corium and clavus entirely devoid of lightish spots. Wings with only adpressed short setae 4
- Corium and often clavus provided with lightish pattern. Wings with only adpressed short setae, or with erect semilong or long setae in addition to short pubescence 8
4. Dorsum shining. Inconspicuous pubescence regular, very short and adpressed. Vertex and pronotum without erect semilong setae 5
- Dorsum dull. Adpressed short pubescence more dense and conspicuous. Vertex and pronotum with some erect dark setae almost as long as the six cephalic bristles ... 6

5. Strongly shining with blue-violet reflection (for further differences with the next species, see p. 240); (Far East of the USSR, Japan) *violacea* sp.n.
- Less obviously polished, deep-black, sometimes with faint bluish reflection; (Far East of the USSR, Korea) *koreana* (Kiritschenko, 1912)
6. Middle pair of cephalic trichobothrial setae arising from pale spot (for further difference with next species, see p. 238) (Siberia, Mongolia, Alaska) *rivularia* (Sahlberg, 1878)
- Middle pair of cephalic trichobothrial setae arising from black cuticle 7
7. Ratio antennal segments 2 + 3 + 4/width of pronotal collar above 3.6. (USSR, region Krasnoyarsk-Irkutsk) *simulans* sp.n.
- Ratio antennal segments 2 + 3 + 4/width of pronotal collar below 3.6: dark extreme of *variabilis variabilis*, and possibly other species of which the extreme melanistic form is not yet known 8
8. Corium with large subapical orange mark on exocorium; otherwise unicolorous black; (Italy, Spain) *heijningeni* (Cobben, 1959)
- Corium with varying lightish pattern 9
9. Pronotum with pale lateral margins. Middle pair of trichobothrial-like cephalic setae arising from pale spot (fig. 7d) 10
- Pronotum and frons of head entirely black 11
10. Clavus proximally with longitudinal lightish spot (fig. 7a); dorsal pubescence not dense, golden; (Transcaucasia) *clavalis* sp.n.
- Clavus proximally without lightish spot; dorsal pubescence dense, silvery; (Mongolia) *kaszabi* (Hoberlandt, 1971)
11. Exocorium with narrow ochreous costal margin along entire length (fig. 10i, n); (S. Kazakhstan) *kerzhneri* sp.n.
- Corium with varying light-dark pattern 12
12. Longest semi-erect dark setae of corium longer than diameter of tibia 3 13
- Longest semi-erect dark setae of corium subequal to or shorter than diameter of tibia 3 18
13. Pronotum without erect setae extending beyond lateral margin. Exocorium with only adpressed short, lightish setae, and a submarginal longitudinal strip devoid of any setosity; base of exocorium mostly wider than base of endocorium, part of lateral

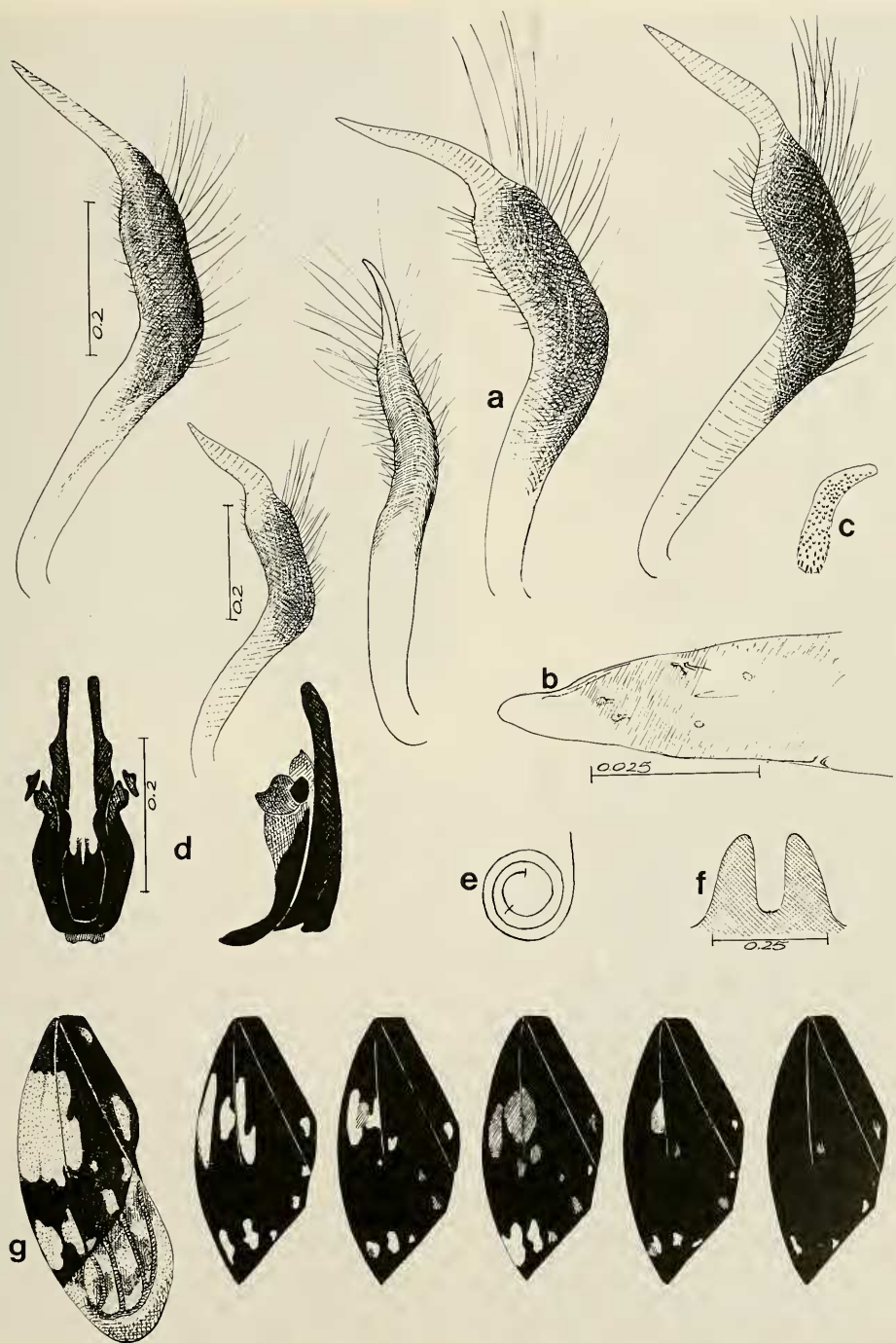


Fig. 20. *Teloleuca kuznezovi*. a, parameres, specimens from different localities in E. Russia and Japan (second picture from left); b, apex of paramere; c, male grasping plate; d, median endosomal sclerite; left, plane view; right, left lateral view; e, base of penisfilum; f, parandria; g, variation of dark-light pigment pattern of fore wing.

outline of forewing straight (fig. 12c). White-black pattern of corium contrasting (fig. 13h); clavus sometimes with subbasal spot. *variabilis connectens* (Horváth, 1888)

The explanate base of the exocorium of *M. variabilis* is not always clear, and sometimes also occurs in other species, e.g. *M. jakovleffi* and *M. nivalis*; these two species, however, lack the hairless exocorial submarginal strip. It is still uncertain whether *connectens* must be considered a subspecies of *variabilis* or a proper species. I have seen material from Morocco, Yugoslavia, Albania, Bulgaria, Rumania and Greece, corresponding with *connectens*. True *variabilis* (endocorium without erect setae) was seen from Sweden, Belgium, France, Spain, Germany, Poland, Austria, Switzerland, Italy, Hungary, Greece, Iran, Iraq and USSR (Georgia, Armenia). This picture would favour the idea of two separate species, with sympatry in the Balkan countries. However, material seen by me from Turkey and Palestine is more or less intermediate as regards the setosity of the endocorium.

- Pronotum with erect setae distinctly extending beyond lateral margin; entire corium with erect setae in addition to adpressed pubescence 14
 - 14. Erect setae of second tibia longer than the spines; erect setae along entire length of third tibia longer than the spines (see also note under *M. scotica*, couplet 16 of this key); (Japan, Shikoku) .. *shikokuana* sp.n.
 - Setae of second tibia not longer than the spines 15
 - 15. Erect setae on external proximal part of third tibia longer than the spines 16
 - Erect setae on external proximal part of third tibia subequal to or shorter than the spines 17
 - 16. Lightish pattern of wing predominantly restricted to exocorium (fig. 14b); large subapical spot on exocorium also persistent in dark specimens; lightish subapical spot of clavus only rarely present. Dorsal pilosity dense; length of erect setae about two times the diameter of the hind tibia; silvery decumbent setae dense, semilong, somewhat shaggy; (Sicily)..... *madonica* (Seidenstücker, 1961)
 - Lightish spots distributed on exo- and endocorium; subapical spot on clavus only absent in dark variants (fig. 14a). Dorsal erect and adpressed pilosity less dense; erect setae subequal to or slightly longer than diameter of hind tibia; (Europe, European part of the USSR; earlier records from Japan refer to *S. nobilis*) *scotica* (Curtis, 1835)
- I have seen one male from Turkey (Caycuma, 31.v.1980, leg. Hava) and two females from Caucasus (Krasnaya, no date, leg. Zhelokhovtsev; Azan, 2600 m, above Rhododendron zone, 1.vii.1974, leg. Behác), with longer pilosity on the legs, nearly as in *M. shikokuana* (couplet 14). In the latter species the dark parts of the wings are ashy-semipruinose black with the distal part of endocorium and medial half of clavus deep satin black. The dark wing pigment of *M. scotica* is unicolorous black. Additional material is needed for a taxonomic interpretation of this type of geographic variation of *M. scotica*.
- 17. Clavus proximally always with small yellowish spot near edge bordering the corium and sometimes with an elongate spot in the edge bordering the scutellum (14f). Light-dark pattern of corium contrasting; lightish spots yellowish; spot on mid part of exocorium divided longitudinally (fig. 14f). Dark pigment of margin of exocorium and apical area of endocorium intense black, contrasting with otherwise ashy black colour; (Japan) *miyamotoi* sp.n.
 - Proximal part of clavus entirely black. Contrast between light and dark pattern of corium not sharply defined. Light spots greyish white; spot on mid part of exocorium usually large and undivided (fig. 14c). Dark pigmentation uniform ashy-black; (Uzbekistan) *tadzhika* (Kiritschenko, 1912)
 - 18. First acetabula entirely or partly lightish 19
 - First acetabula black 21
 - 19. Wings dull, with only adpressed short silvery setae. Middle trichobothrial-like cephalic setae arising nearly always from pale spot. First coxae for major part pale. Wing pattern variable; preponderance of white markings on endocorium; in darker forms markings disappear first on exocorium; (Alaska)..... *monae* (Drake, 1952)
 - Wings weakly shining; semilong erect setae are present in addition to the short decumbent golden pubescence 20
 - 20. First acetabula entirely pale. Wing pattern as in fig. 14l; (E. Kazakhstan) *oblonga acetabularis* subsp.n.
 - First acetabula dark with pale apical margin. Corium for major part testaceous (fig. 14k); membrane hyaline. Clavus sometimes with subbasal pale stripe. Legs predominantly yellowish; (Kazakhstan) *koktshetavica* sp.n.
 - 21. Second antennal segment with only very short pubescence. Proximal part of exocorium wider than base of endocorium (fig. 12b); part of external outline of left and

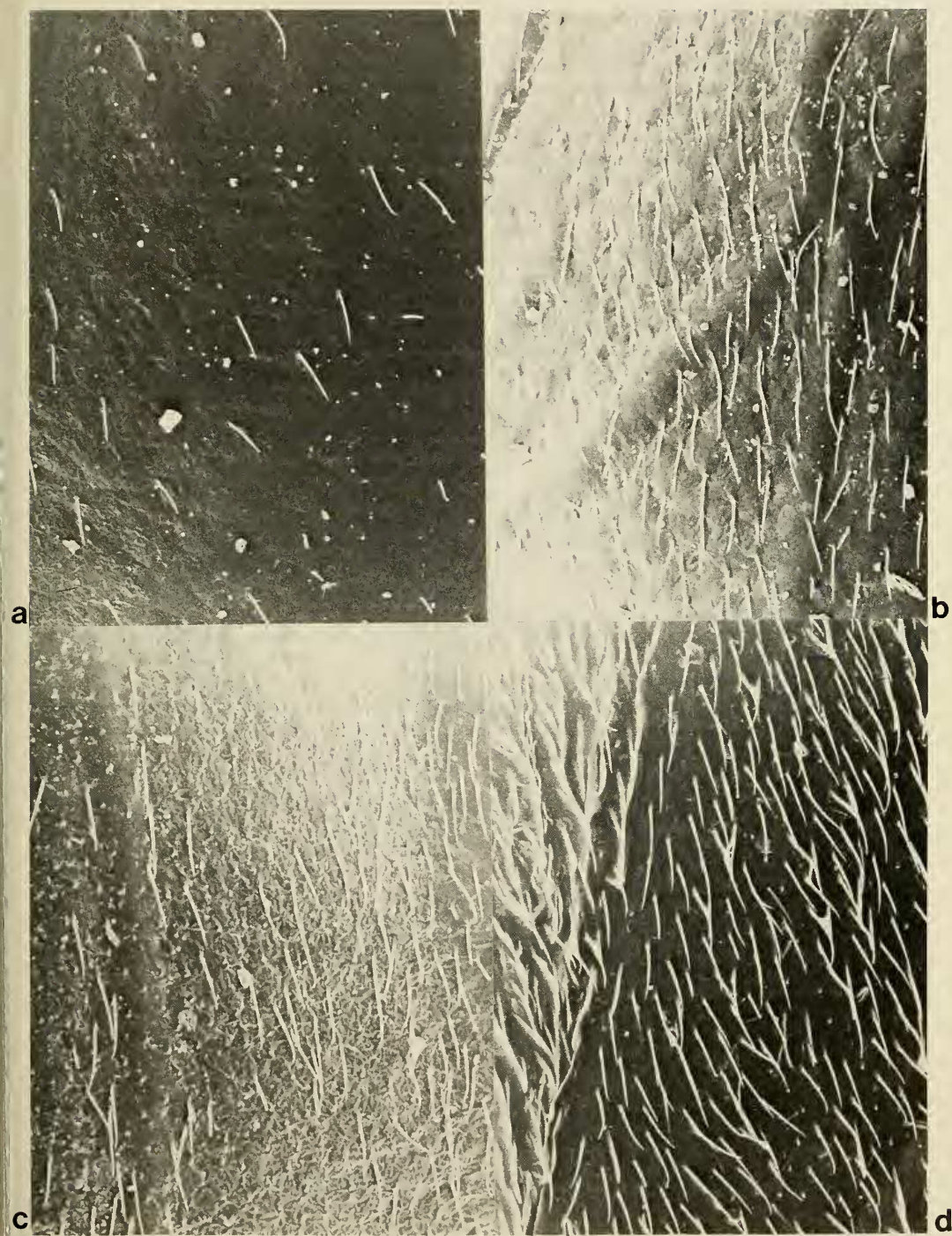


Fig. 21. *Salda* species scanning micrographs of mid part of corium to show differences in densities of setae (60 $\times$). a, *S. morio*, Japan; b, *S. muelleri*; c, *S. littoralis*; d, *S. kiritsjenkoi*.

right wing parallel-sided (not clearly present in some specimens). Wing dull-black with usually two larger well-demarcated spots on exocorium and some smaller ones on endocorium (fig. 13i); stronger tendency to complete melanism than in the subsp. *connectens*, particularly in specimens from the Caucasus; membrane usually unicolorous smoky black. See remarks at couplet 13, sub *variabilis connectens* *variabilis variabilis* (Herrich-Schaeffer, 1835)

- Second antennal segment with very short pubescence and with some erect, somewhat longer setae over entire length of segment. Proximal part of exocorium about as wide as base of endocorium or wider; outline of wing margin regular convex 22
- 22. Erect setae on corium of about same length as the width of third tibia. Colouration of short pubescence of wing mostly golden. Marginal setae along anterior edge of pronotum shorter than diameter of one ocellus. Wing design usually as in fig. 71, drawings 2 and 3; lightish pattern testaceous, not very contrasting; base of clavus rarely with pale spot along claval suture; membrane smoky with dark patches in between the veins; (Transbaicalica) *oblonga oblonga* (Stål, 1858)
- Pubescence of wing clearly shorter than diameter of third tibia. Marginal setae along anterior edge of pronotum longer than or subequal to diameter of one ocellus, rarely shorter. *jakovlevfi* (Reuter, 1891), *mongolica* (Kiritshenko, 1912) and *nivalis* (Lindberg, 1935) (see following discussion).

At the end of this key three species remain which caused some nomenclatorial problems: *M. jakovlevfi*, *M. mongolica* and *M. nivalis*. I give the following explanation and hope that my proposal on the nomenclature will prove to be correct.

M. jakovlevfi (Reuter, 1891). Reuter described this species from Turkestan, Dschiptik, D. Fedtschenko and, judging from his notation "long ♀ 6—7½ mill.", he apparently had the disposal of at least two females. The diagnosis refers to a species without erect setae, with shining head and thorax, and with a number of white spots on the forewing. Reuter pointed out that the species differs from the hirsute *M. scotica*, but that the differences with *M. variabilis* are difficult to describe. So far I could not trace the type material of *M. jakovlevfi*, but received

one male and one female from the Reuter coll., labelled Turkestan Dschilarik (about 540 km NE of the type locality), leg. J. Sahlberg. The distribution of the lightish wing spots (fig. 14d, second picture from left) conforms more or less with the description of the type material. Since head and pronotum are rather shiny, it seems logical to attribute the male and female in question provisionally to *M. jakovlevfi*. I propose to designate the male as the neotype in case the original specimens will not emerge¹). The two specimens from Dschilarik possess a character not mentioned by Reuter but of possible importance for identification. The laterofrontal edges of the pronotum are beset with a fringe of densely packed whitish setae (fig. 13j); the length of these setae is variable in longer series (see below).

M. mongolica (Kiritshenko, 1912). I studied one specimen marked with the type indication of the Leningrad Museum. Since it bears exactly the same locality data as given in the original description (Mongolia: decliv. septentr. Altai Mongolici: ripae lacus Kobdo Inferioris (P. K. Kozlov. viii.1899) I take it for granted that it is the specimen on which Kiritshenko based his description. The body dimensions (5.5. mm—2.5 mm) also fit the description, but instead of a male, as indicated, it appears to be a female. I provisionally suggested that this single type specimen might be conspecific with *M. jakovlevfi* as conceived above.

The anteromarginal fringe of setae on the pronotum is not well-developed, but as mentioned before, this character also greatly varies in other material from Mongolia. Additional material from Mongolia seen by me originates from the following localities: SE Arakhangaj, Sharagoldzi (Shargoldzuty-gol) river, 20—40 km NNE Bajan Khongor, 1 ♀, 25.vii.1926, leg. Kiritshenko; Ongin (Ongin)-Gol river, upper part, 50 km NNW Arvaj-Kheer, 5 ♂ 4 ♀, 14.vii.1926, leg. Kiritshenko (together with *M. oblonga*; Bajanchonger aimak, Changaj Mts Somon Zag, river Zaggol, 2100 m, 2 ♂ 1 ♀, 18.vii.1966, expedition Kaszab (Hoberlandt, 1971b, referred to the males (loc. no. 79) as *M. oblonga* and to the female (log. no. 708) as *M.*

¹) Dr Kerzhner informed me very recently that Dr A. V. Sviridov let him know, in a letter of 11.viii.1985, that the type of *M. jakovlevfi* is in the Zoological Museum of the Moscow University; its length is 6.2 mm, the sex is not indicated, and it is labelled: "Dzhiptyk" (in Cyrillic characters), and "*Acanthia jakovlevfi* Reut".

mongolica. This material is plotted on map 2, provisionally as *M. mongolica*, although I initially was inclined to consider them conspecific with *M. jakovleffi*. After correspondence with Dr Lindskog I now adopt a more conservative attitude. Recent expeditions made in Mongolia and China probably contain large samples of the *jakovleffi* complex. Scrutinizing this material might solve whether some minor differences revealed between true *M. jakovleffi* and the sparse material of *M. mongolica* at hand are constant enough to uphold *M. mongolica* as a valid taxon (species or subspecies).

M. nivalis (Lindberg, 1935) (comb. nov.; described as *Acanthia nivalis*). The type locality of

this species is Kashmir, Tehrong valley near Siachen glacier, 4125 m, 20—26.vi.1929, leg. J. A. Sillem, Netherlands Karakorum expedition. The type material located in the Zoological Museum Amsterdam consists of one female and four larvae. The second adult mentioned in the original publication could not be traced. Although the single female at hand is in a teneral condition, some characters match the series I could study from mountainous areas north of Kashmir, which differs from *M. jakovleffi*. Such characters are: dull dorsal cuticle, more dense silvery adpressed setae, and rather porrect anteclypeus (fig. 14g). Despite of the incomplete information on the type material of *M. nivalis* I am

	<i>jakovleffi</i>	<i>nivalis</i>
size and shape	generally larger, male less slender, female more slender	generally smaller, male more slender, female less slender
length male	5.0—6.0 mm (mean <u>5.4</u>) (n = 13), width 2.0—2.4 mm (mean <u>2.2</u>); ratio l/w 2.0	4.5—5.0 mm (mean <u>4.7</u>) (n = 13), width 1.9—2.7 mm (mean <u>2.1</u>); ratio l/w 2.24
length female	6.0—7.0 mm (mean <u>6.4</u>) (n = 11), width 2.6—2.9 mm (mean <u>2.8</u>); ratio l/w 2.3	5.1—6.0 mm (mean <u>5.5</u>) (n = 13), width 2.3—2.8 mm (mean <u>2.6</u>); ratio l/w 2.1
membrane	fully developed	slightly reduced
general colour	black	ashy black
head and pronotum	rather shiny	rather dull
adpressed setae of corium	usually greyish or golden, not striking	silvery and dense (fig. 15a)
eunomy of wing	fig. 14d	fig. 14e ¹)
longitudinal spot in basal half of endocorium	undivided in pale specimens, often parallel with adjacent spot of exocorium	subdivided; marginal spot halfway exocorium (see arrow) mostly present
head in front of eyes	less porrect (fig. 14h, left)	more porrect (fig. 14g, left) due to bulging anteclypeus and more transverse swelling above anteclypeus (fig. 14g, right)
parandria	widely incised (fig. 12j)	incision narrow (fig. 12k)
paramere	with broad processus sensuais and regular external outline (fig. 12h)	with pointed processus sensuais and somewhat undulated external outline (fig. 12g)

¹) Dr Kerzhner wrote me that the variability of wing design is more diversified than presented in fig. 14e.

more inclined to treat the material listed below as *M. nivalis*, rather than to describe it as a new species. Before having studied the type of *M. nivalis* I named this species in 1960, in manuscript, as *Saldula horvathi*, and I misused this name as nom. nud. in one of the chapters of my book (Cobben 1968: 20) dealing with the eggs of Heteroptera.

Making allowance for some mentioned nomenclatorial uncertainties, the differences between *M. jakovlevfi* and *M. nivalis* can be tabulated as above.

The material verified by me, mostly present in the Leningrad Coll. and the Coll. Yu. Popov, Moscow, is plotted on map 2; some additional symbols have been added on map 2 in accordance with recent information supplied by Dr Kerzhner.

M. jakovlevfi:

Kirghizia, Tien Shan, Kirghizskij Ridge (= Aleksandrovskij Ridge), gorge Kenkol, 4 ♂ 1 ♀, 17.vii.1930, leg. V. Bianchi; idem, Kirghizskij ridge, Frunzenskaja province (= Semirechenskaja province), 3800 m, 1 ♀, 15.vii.1910, leg. Kiritshenko; idem, Terskej Alatau Ridge (southern side of eastern part of Ridge), Kujlu river (100 km SE Issyk-Kul lake), 1 ♂, 24.vi.1902, leg. Saphozhnikov, idem, Terskej Alatau Ridge, Karagatuz river, 1 ♂, 26.vi.1902, leg. Sapozhnikov; idem, Terskej Alatau, Karasaj river (the Upper Naryn river, 80 km S of Issyk-Kul lake), Pokrovskie syrts (plateau), 1 ♂ 2 ♀, 29.vii.1965, leg. R. Zlotin; idem, Terskej Alatau Ridge, Karasaj river, 1 ♂, 14.viii.1953, leg. D. Panfilov; idem, Fergansky Ridge (Nw part), Kizylunkur river (the Upper Karaunkur river), 20 km N of Arslanbob, 1 ♂, 8.viii.1958, leg. Yu. Popov. Syrt Arabel, 1 ♂ 1 ♀, no further data, type locality of var. *moerens* Horv., 1904; Djergalan-Tjuk, leg. Almasy, no further data. Kazakhstan, Tien Shan, Zailijskij Alatau Ridge, Bolshaja Almaatinka river (15—20 km S Alma-Ata), 3 ♀, 25—28.vii.1928, leg. Shnitnikov; idem, Saur Ridge, Karasu river (the Upper Kenderlyk river; 50 km SE Zaisan lake, 9 ♂ 6 ♀, 18.vi.1965, leg. Yu. Popov, 3 ♂ 3 ♀, 20.vi.1965, leg. I. Sukatsheva. Uzbekistan, Tshimangan near Tashkent, 1 ♀, 13.vii.1924, leg. Martynova; idem, Tshimangan Mt, Tian-Shan, 2000 m, 5 ♂, 9.vi.1982, leg. P. Štys. leg. Almasy. Tadzhikistan, Pamiro-Alaj Alajskaja valley (eastern part), near Irkeshtam, 1 ♀, 20.vi.1960, leg. I. Lopatin; idem, Kzyl-Rabat, 1 ♀, 11.vii.1960, leg. Lopatin; idem, Murgab, 1 ♂, 24.vi.1937, leg. Luppova & Redikortsev.; Altai, Tshagan-Uzun—Taldur, 6.viii.1912, leg. Sushkin; Shavoz, river Shakh dara, 2 ♂, 10.vi.1956, leg. Zhelokhovtsev.

M. nivalis:

Type-locality: Kashmir, Tehrong Valley. Kirghizia, Kirghizsky ridge (= Aleksandrovskij Ridge), Frunzenskaja province (= Semirechenskaja province),

3800 m, 1 ♀, 15.vii.1910, leg. Kiritshenko; idem, Tien Shan, Chatkalskij (Tschatkalskij) Ridge (NE part), Sary-Chilek Lake, 2500 m, 1 ♂, 13.viii.1957, leg. Yu. Popov; idem, N. Park, Ala-Archa nr. Frunze, 2200—2800 m, 14 ♂ 13 ♀, 22.vi.1982, leg. P. Štys; idem, 2100 m, 1 ♂ 1 ♀, 6—9.vii.1976, leg. J. Král; Fergana mer., Alai, Artschi-Bashi, large series, 12.vi.1908, leg. Kiritshenko; Syrt Arabel, leg. Almasy, 2 ♀, no further data. Kazakhstan, Zailijskij Alatau Ridge, gorge Gorelnyi (15—20 km S Alma-Ata), 2000 m, 1 ♀, 24.viii.1958, leg. D. Panfilov.

It appears from the distribution pattern now known (map 2) that *M. nivalis* and *M. jakovlevfi* are exclusively mountainous species (registered altitudes from 2000—3800 m with ranges coinciding in the Kirghizia area (37—45° latitude). Some locality data and collecting dates are even the same for both species. Dr Kerzhner informed me that both were collected near Alma-Ata in the same valley, but at different sites. The poorly explored mountains at lower latitudes disclosed so far only one locality of *M. nivalis* (35°) and two females from 27.5° latitude (Buthan, 20 km S of Thimphu, 2300 m, 18.v.1972, Bhutan expedition Nat. Hist. Mus. Basel) which belong to the *jakovlevfi-mongolica* complex. The range of *M. nivalis* apparently does not extend to the Mongolian mountain chains, whereas the range of *M. jakovlevfi* seems to continue into W. Mongolia, either with conspecific populations or with a very close relative (*M. mongolica*, see above).

COMMENTS ON THE ZOOGEOGRAPHY OF *MACROSALDULA*, *SALDA*¹⁾, AND *TELOLEUCA*

The ancestors of these three genera apparently originated somewhere in the Palaearctic Region. Only two species of *Macrosaldula* occur in the Nearctic Region (Alaska), viz. *M. rivularia* Sahlb. and *M. monae* Dr. The latter species is only known from Alaska, whereas *M. rivularia* is one of the very few *Macrosaldula* species of which the range extends into the arctic zone (maps 1, 2). The characters of both species, with only one exception, conform with those of Palaearctic *Macrosaldula*. *Salda littoralis* is the only Holarctic species of the genus. With respect to one phylogenetically most important male genital character which is shared by all Old World species, it is more plesiomorphic than the remaining seven exclusively New World species.

¹⁾ *Salda henschi* Reut. and *S. sahlbergi* Reut. are left out of account, since Dr P. Lindskog is revising this couple of species.

Of the genus *Teloleuca*, the sister group of *Salda*, two of the four Eurasian species also live in the northern part of the New World. This three-fold picture speaks well for a common migration route from the Old World across the Bering Strait after separation of the northern continents.

Combining the Eurasian distribution patterns (maps 1—4) the broad band area from Central Europe across Siberia, which is practically without any records of the saldids discussed, becomes apparent. This absence of records certainly coincides with paucity of sampling. The distribution maps of Gerridae (Kanyukova, 1982) reveal a rather similar pattern, although this group of waterstriders seems to have been explored better than shorebugs in the European part of the USSR. It may, however, be expected that even after more extensive exploration of the West Siberian lowlands, the general distribution patterns of the species treated in the present paper will not change markedly.

The distribution patterns of maps 1—4 make at first sight clear that species of the three genera considered here are predominantly mountainous (note the absence of data from the Ural) and that the largest number of species is found in Central Asia, E. Siberia + Mongolia and the Far East (8(3), 11(3) and 9(2) species, respectively; numbers between brackets refer to endemic species). From Japan seven species are presently known of which two *Macrosaldula* species seem to be restricted to this archipelago (an additional species from Japan will be described by Dr J. Polhemus (in litt)). The European part of the USSR harbours six to seven species, of which only *M. scotica* (Curt.) and *M. variabilis* (H.—S.) are typical European elements. Few species are confined to the Mediterranean region: *M. heijningeni* Cobben and *M. madonica* Seid.

It is too early to discuss the ecological diversifications of the various eastern species, because locality data are not detailed enough as regards habitat characteristics and altitudinal stratifications. Some species are labelled as occurring in the same locality, such as *M. inornata* and *M. variabilis*, *M. variabilis* and *M. scotica*, *S. muelleri* and *S. kiritschenkoi*, and *S. micans*, *S. splendens* and *S. morio*. Small-scale ecological displacements are predictable in such cases. Of great interest is to know more of the habitat requirements of the atypical *Macrosaldula roborowskii* which is only known from two localities (map 1) in W China. Its *Chartos-*

cirta-like facies suggests a habitat which might be quite different from those of its congeners which generally inhabit stony banks along streams.

Saldidae, constituting a uniform group of wet-soil-dwelling, carnivorous Heteroptera exhibiting a large amount of wing-polymorphism, are as ideal for eco-geographical studies as Carabidae are among Coleoptera. It is hoped that the present taxonomic contribution will foster large scale collections and detailed field observations of shore bugs in the vast Asian continent.

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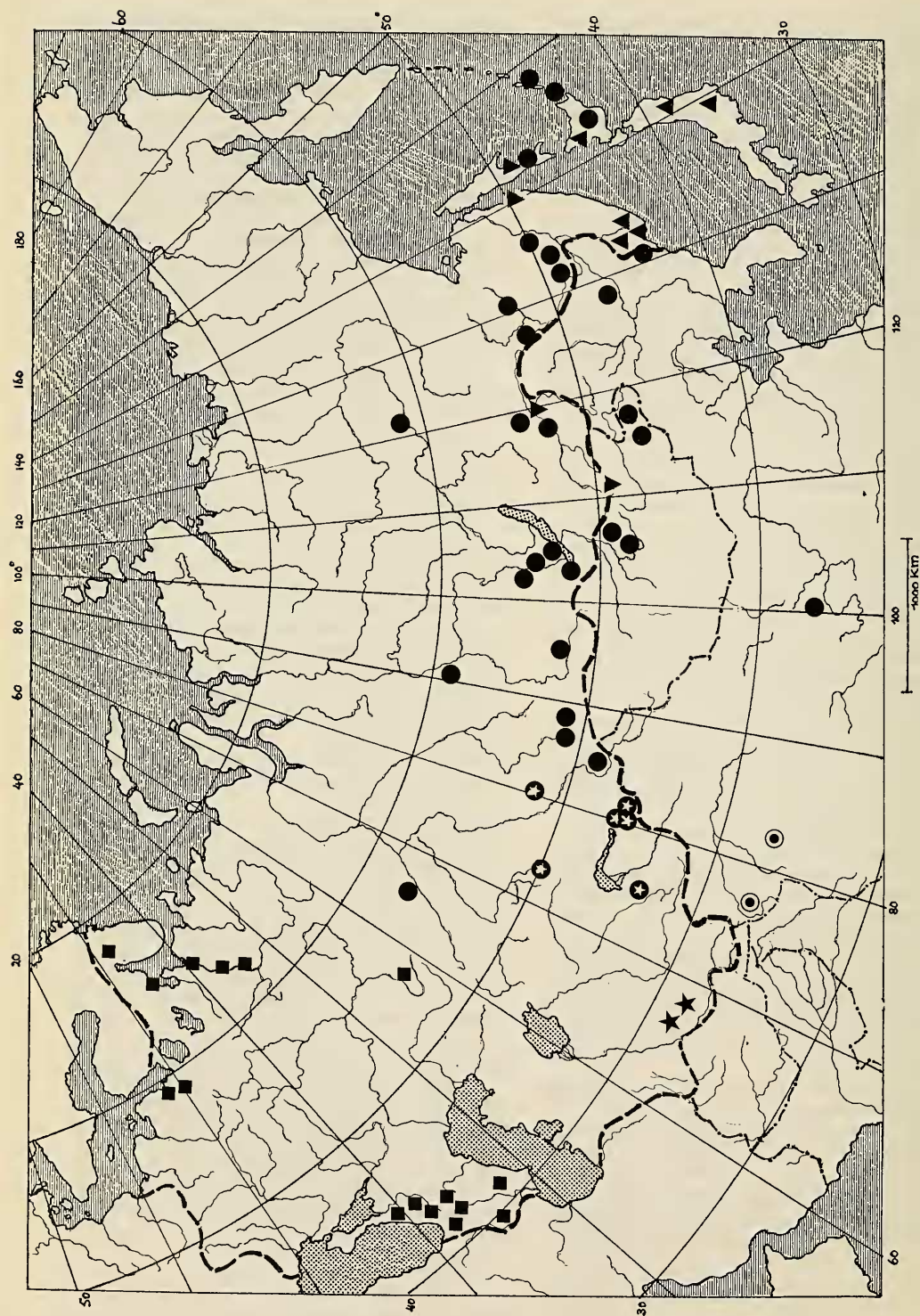
The preparation of this paper would not have been possible without the help of Dr I. Kerzhner (Zoological Institute, Leningrad), who spent much time in translating and mapping the Russian locality data. I thank him very much for his continuous interest in this project and for his generosity in sending material all over again. I thank Dr Lindskog and Dr Štys for their comments on the manuscript, and Dr Polhemus for permission to list some records of species collected by him in Japan in 1980. The assistance of the following colleagues in supplying material is greatly acknowledged: M. Brancucci (Basel), W. R. Dolling (London), S. Drosopoulos (Athens), J. Duffels (Amsterdam), K. K. Günther (DDR, Berlin), H. Hasagawa (Ibaraki), E. Heiss (Innsbruck), L. Hoberlandt (Prague), J. Lattin (Corvallis), P. Lindskog (Stockholm), J. Martens (Mainz), S. Miyamoto (Fukuoka), R. Poggi (Genoa), J. Polhemus (Englewood), Yu. Popov (Moscow), R. Remane (Marburg), M. Satô (Tokyo), A. Soós (Budapest), P. Štys (Prague), M. Tórnókuni (Tokyo), T. Vásárhelyi (Budapest).

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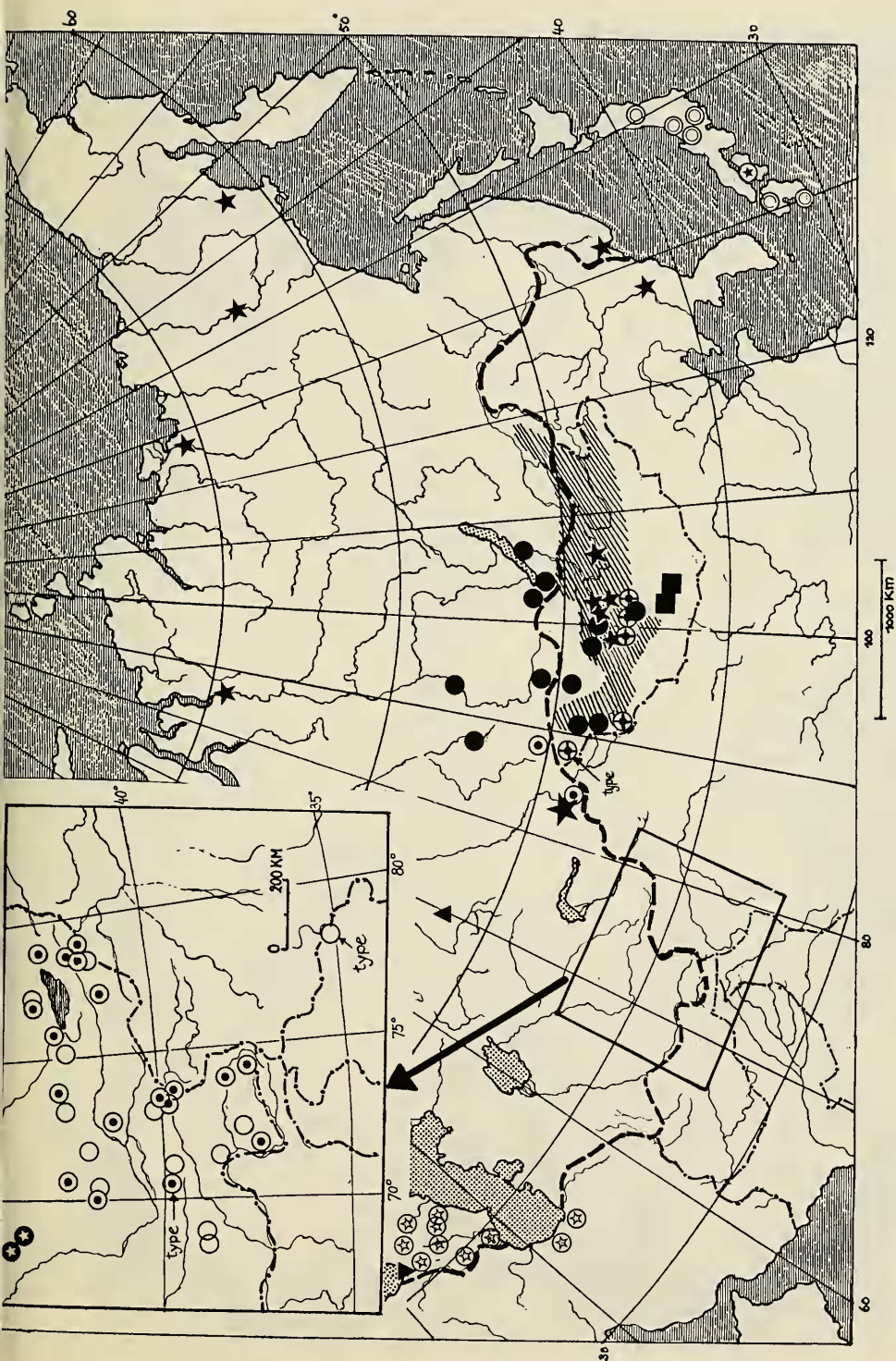
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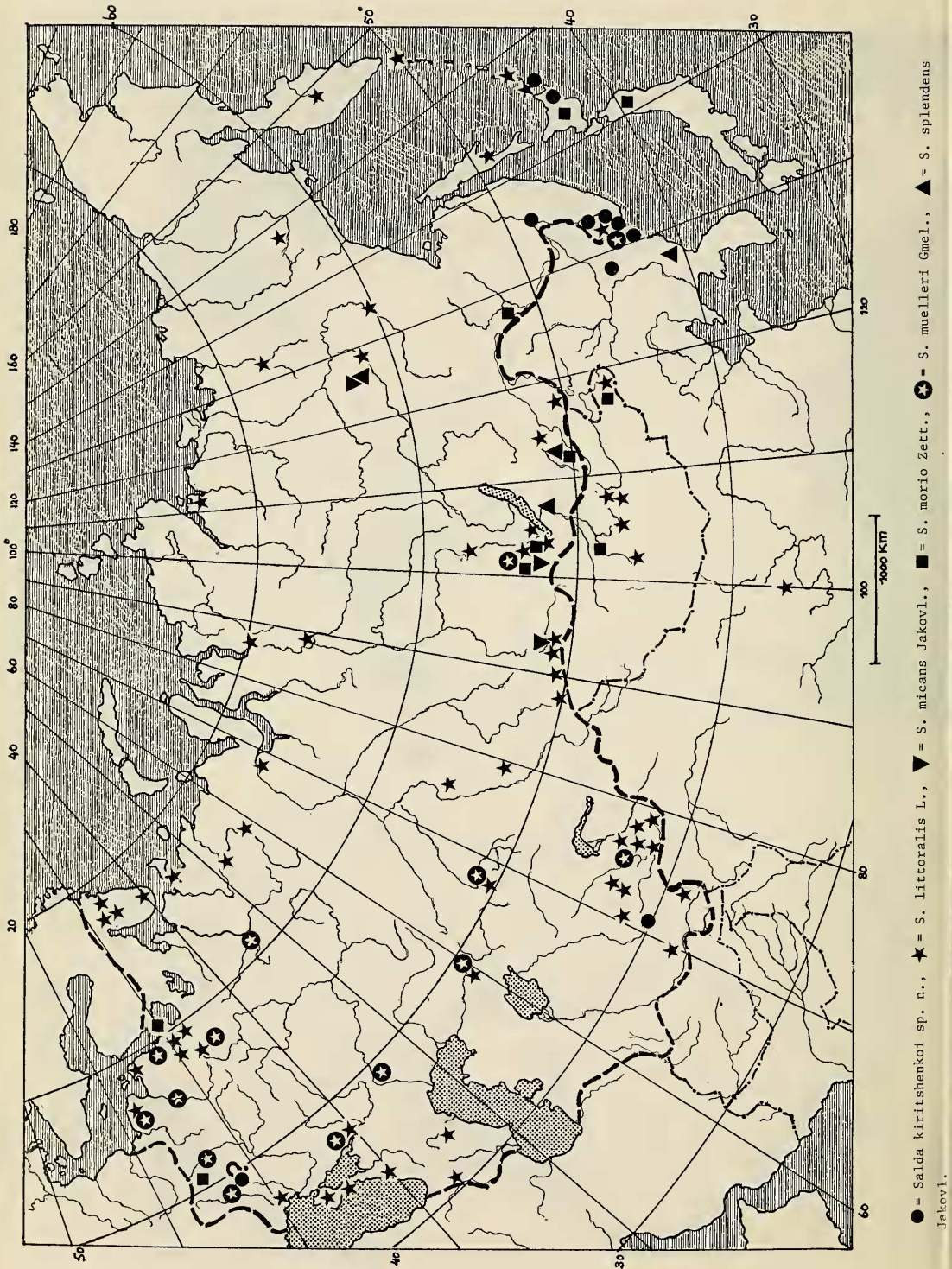
● = *Saldula nobilis* Horv., ★ = *S. sibiricola* sp. n., ▼ = *Macrosaldula koreana* Kiritsch., ■ = *M. scotica* Curt., ▲ = *M. violacea* sp. n., ⊙ = *M. roborowskii* Jakovl.

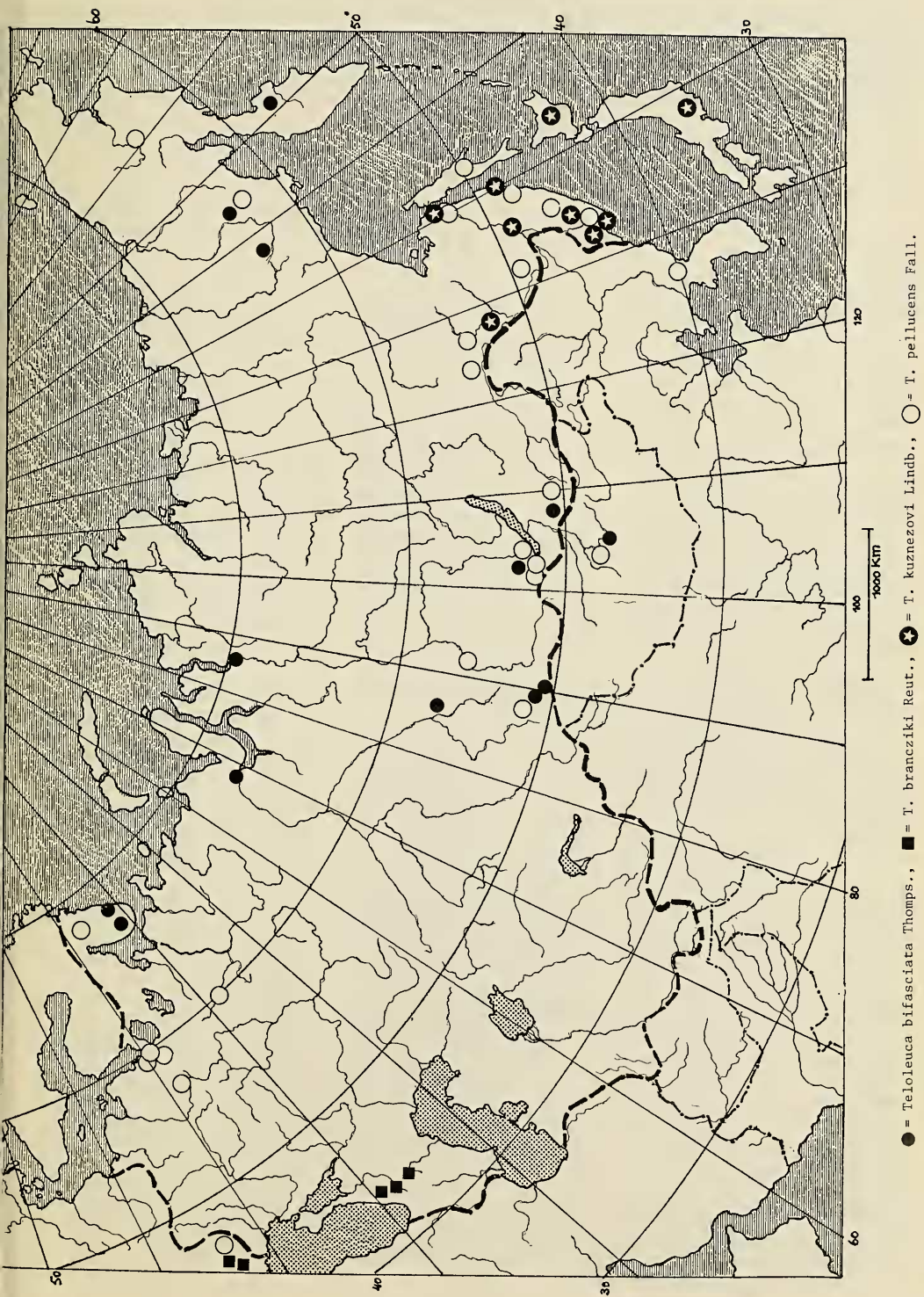
Map 1. Known distribution patterns of some *Saldula* and related species.



- ▽ = *Macrosaldula clavalis* sp. n., ⊙ = *M. jakovleffi* Reut., ■ = *M. kaszabi* Hoberl., ⊕ = *M. kerzhneri* sp. n., ▲ = *M. kokshetavica* sp. n.,
 ⊖ = *M. miyamotoi* sp. n., ⊕ = *M. mongolica* Kir.?, ○ = *M. nivalis* Lindb., // = *M. oblonga* Strål, ★ = *M. oblonga acetabularis* subsp.
 n., ★ = *M. rivularia* Sahlb., ⊕ = *M. shikokuana* sp. n., ● = *M. simulans* sp. n., ⊕ = *M. variabilis* variabilis H.-S.

Map 2. Known distribution patterns of some *Macrosaldula* species in the USSR and Far East countries. Localities in Scandinavia and Poland have not been mapped.





Map 4. Known distribution of *Teloleuca* species in the USSR and Far East countries. Localities in Scandinavia and Poland have not been mapped.

Table 1. Some measurements of *Halosalda*, *Saldula*, *Macrosaldula*, *Calacanthia* and *Salda* species (in mm). Data are presented for only four specimens at the most; when longer series are available more data can be found in the descriptions. The length of antennal segments 3 and 4 is inclusive the proximal intersegmental ring, which creates some variation in the measurements since the internodes are not always fully visible.

species	sex	total length	total width	head					pronotum			antenna				leg 3	
				width	vertex at level of ocelli	frons at narrowest	width of ocellus	distance between ocelli	length	with of collar	width at the base	1	2	3	4	tibia	tarsus
<i>Halosalda coracina</i> sp.n.	♂	3.4	1.6	0.96	0.32	0.28	0.04	0.07	0.52	0.56	1.16	0.26	0.68	0.44	0.42	1.60	0.64
	♂	3.6	1.6	0.94	0.36	0.28	0.05	0.05	0.58	0.56	1.20	0.26	0.68	0.44	0.46	1.52	0.68
	♀	3.8	1.9	1.00	0.38	0.32	0.03	0.03	0.54	0.58	1.28	0.28	0.78	0.48	0.44	1.78	0.68
	♀	3.7	1.8	1.00	0.36	0.32	0.03	0.04	0.52	0.60	1.30	0.28	0.76	—	—	1.72	0.66
<i>Saldula hasegawai</i> sp.n.	♂	3.05	1.59	0.89	0.34	0.24	0.05	0.05	0.46	0.54	1.15	0.29	0.55	0.41	0.41	1.48	0.51
	♂	3.16	1.70	0.95	0.31	0.24	0.05	0.05	0.49	0.55	1.20	0.29	0.57	0.46	0.45	1.51	0.52
<i>Saldula taiwanensis</i> sp.n.	♀	3.55	1.90	0.94	0.35	0.25	0.07	0.04	0.50	0.58	1.30	0.30	0.62	0.45	0.45	1.59	0.56
	♂	3.5	1.75	1.04	0.40	0.26	0.06	0.04	0.48	0.56	1.32	0.36	0.70	—	—	1.68	0.64
	♂	3.6	1.70	1.04	0.38	0.24	0.06	0.04	0.48	0.56	1.32	0.36	0.68	0.46	0.46	1.64	0.63
	♀	4.0	1.90	1.08	0.40	0.32	0.07	0.04	0.52	0.62	1.44	0.38	0.72	—	—	1.76	0.68
	♀	3.75	1.90	1.04	0.40	0.28	0.07	0.04	0.56	0.60	1.40	0.36	0.70	0.45	0.44	1.76	0.63
<i>Saldula burmanica</i> subsp.n.?	♂	3.60	1.78	1.08	0.41	0.28	0.07	0.04	0.50	0.65	1.36	0.28	0.70	0.48	0.54	1.75	0.63
	♂	4.22	1.99	1.16	0.45	0.32	0.05	0.05	0.60	0.72	1.60	0.29	0.75	0.53	0.58	1.95	0.73
	♀	4.14	2.28	1.18	0.48	0.35	0.07	0.05	0.56	0.70	1.63	0.28	0.73	0.50	0.51	1.90	0.75
	♀	3.39	2.10	1.18	0.45	0.34	0.06	0.05	0.56	0.73	1.48	0.28	0.73	0.53	0.57	1.88	0.71
<i>Saldula sibiricola</i> sp.n.	♂	4.3	2.1	1.16	0.35	0.28	0.06	0.03	0.66	0.66	1.35	0.38	0.90	0.57	0.60	2.10	0.85
	♂	4.5	2.3	1.20	0.40	0.30	0.06	0.03	0.70	0.70	1.42	0.33	0.90	0.54	0.59	2.15	0.87
	♀	4.9	2.4	1.25	0.42	0.31	0.07	0.03	0.70	0.71	1.55	0.35	1.00	0.62	0.65	2.40	0.96
<i>Macrosaldula clavalis</i> sp.n.	♂	4.0	1.7	0.96	0.40	0.32	0.08	0.02	0.46	0.56	1.40	0.28	0.76	0.45	0.45	2.20	0.68
	♀	4.8	2.0	1.04	0.44	0.38	0.08	0.03	0.52	0.72	1.64	0.36	0.88	0.60	0.54	2.44	0.78
<i>Macrosaldula inornata</i> sp.n.	♂	4.3	1.7	1.0	0.44	0.36	0.08	0.04	0.54	0.64	1.44	0.24	0.80	0.54	0.52	2.10	0.68
	♂	4.5	1.8	1.0	0.44	0.36	0.08	0.03	0.54	0.62	1.48	0.24	0.80	0.56	0.54	2.10	0.64
	♀	4.7	2.0	1.06	0.48	0.44	0.09	0.04	0.60	0.72	1.72	0.28	0.90	0.58	0.56	2.52	0.76
	♀	4.9	2.0	1.03	0.52	0.40	0.09	0.04	0.52	0.72	1.64	0.27	0.90	0.58	0.54	2.36	0.69
<i>Macrosaldula kerzhneri</i> sp. n.	♂	5.9	2.4	1.28	0.60	0.36	0.08	0.02	0.70	0.76	1.92	0.52	1.40	0.92	0.84	3.24	1.00
	♀	7.1	3.0	1.38	0.60	0.48	0.09	0.02	0.80	0.80	2.16	0.56	1.60	0.96	0.88	3.92	1.18
	♀	7.2	3.0	1.40	0.64	0.46	0.09	0.03	0.88	0.84	2.16	0.53	1.56	0.92	0.84	3.84	—
<i>Macrosaldula koktshetavica</i> sp.n.	♂	4.7	1.9	1.16	0.48	0.36	0.08	0.02	0.56	0.68	1.56	0.36	0.92	0.54	0.54	2.36	0.88
	♂	4.3	1.9	1.14	0.50	0.34	0.07	0.02	0.56	0.66	1.48	0.36	0.92	0.56	0.54	2.32	0.89
	♀	5.0	2.2	1.20	0.46	0.40	0.09	0.03	0.60	0.72	1.72	0.38	1.02	0.56	0.56	2.48	0.96
	♀	5.0	2.1	1.20	0.50	0.40	0.08	0.03	0.60	0.68	1.72	0.32	0.96	0.58	0.54	2.40	0.92
<i>Macrosaldula miyamotoi</i> sp.n.	♂	4.8	1.9	1.04	0.48	0.32	0.08	0.03	0.48	0.64	1.56	0.32	0.86	0.58	0.56	2.24	0.72
	♂	4.4	1.9	0.98	0.38	0.28	0.07	0.03	0.48	0.60	1.52	0.28	0.84	0.46	0.46	2.20	0.76
	♀	5.3	2.3	1.08	0.44	0.32	0.09	0.04	0.52	0.68	1.68	0.36	0.96	0.64	0.60	2.72	0.78
<i>Macrosaldula shikokuana</i> sp.n.	♂	4.8	2.0	1.04	0.42	0.30	0.08	0.03	0.46	0.64	1.56	0.32	0.92	0.60	0.58	2.36	0.78
	♀	5.4	2.4	1.08	0.40	0.32	0.09	0.03	0.56	0.66	1.72	—	—	—	—	2.64	0.76
<i>Macrosaldula simulans</i> sp.n.	♂	6.3	2.9	1.36	0.56	0.44	0.08	0.02	0.80	0.80	1.88	0.52	1.60	0.98	0.80	3.76	1.08
	♀	6.7	3.0	1.32	0.56	0.42	0.12	0.03	1.12	0.80	2.12	0.52	1.52	0.92	0.84	3.60	1.10
	♀	6.5	2.9	1.32	0.52	0.43	0.10	0.04	0.76	0.84	2.12	0.56	1.60	0.93	0.85	4.00	1.20
<i>Macrosaldula violacea</i> sp.n.	♂	5.4	2.1	1.28	0.48	0.30	0.08	0.04	0.62	0.68	1.80	0.52	1.36	0.64	—	2.56	0.98
	♂	5.2	2.1	1.24	0.48	0.29	0.08	0.02	0.64	0.68	1.72	0.48	1.36	0.72	0.68	2.88	0.96
	♀	5.9	2.4	1.24	0.46	0.36	0.09	0.03	0.64	0.72	1.84	0.48	1.44	0.76	0.72	2.96	1.10
	♀	6.0	2.35	1.24	0.40	0.46	0.09	0.02	0.64	0.72	1.92	0.48	1.32	0.76	—	2.84	1.01
USSR	♂	5.85	2.12	1.30	0.48	0.34	0.1	0.03	0.65	0.75	1.75	0.55	1.50	0.80	0.72	2.94	1.00
<i>Calacanthia grandis</i> sp.n.	♀	7.5	3.8	1.64	0.78	0.52	0.1	0.08	0.92	1.00	2.40	0.72	1.72	1.00	1.12	4.16	1.28
<i>Salda kiritshenkoi</i> sp.n.	♂	6.0	2.8	1.48	0.49	0.38	0.09	0.04	0.90	0.82	2.05	0.49	1.23	0.78	0.82	3.10	1.25
	♂	5.4	2.8	1.46	0.42	0.32	0.09	0.04	0.92	0.80	2.00	0.48	1.20	0.80	0.80	2.96	1.20
	♀	6.6	3.4	1.72	0.57	0.40	0.10	0.05	1.0	0.98	2.46	0.51	1.34	0.82	0.81	3.55	1.29
semi brachypt.	♀	6.2	3.4	1.62	0.54	0.43	0.10	0.06	0.92	0.92	2.36	0.50	1.32	0.81	0.81	3.36	1.28